Issue #295

OUR 25th ANNIVERSARY YEAR!

April 1985
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73 for Radio Amateurs®

A CWC/P Publication

International Edition

Hamvention Directions '85:
What To Focus On

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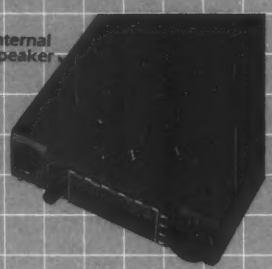

32 PL Frequencies. The IC-27A/37A/47A come complete with 32 PL frequencies.

9 Memories. The compact mobiles have 9 memories which will store the receive frequency, transmit offset, offset direction and PL tone. All memories are backed up with a lithium battery.

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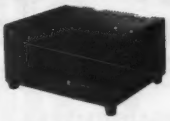

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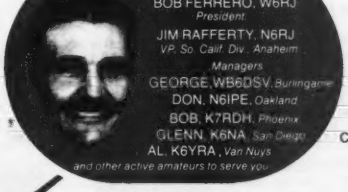

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73 for Radio Amateurs®

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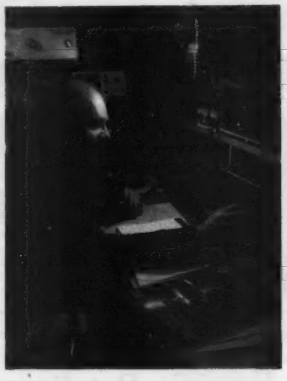
NEVER SAY DIE

editorial by Wayne Green



SUED

Ask me how it feels to be sued by multi-billion-dollar organizations. I'm getting to be an expert. Ten years ago AT&T was after me, and now it's CBS!

With large firms like those, one never actually knows the real purpose of the suit. Several members of the press have called CBS to try to find out what's behind this latest attack on Wayne Green, but all they get is either a "no comment" or, more often, no returned call.

The suit has to do with my starting a magazine a few months ago called *Digital Audio*. This has to do with the new compact-disc field, which is just really getting started. CBS, which publishes both *Audio* and *Stereo Review* magazines, the two largest in the hi-fi field, is claiming that the use of the word "audio" in the *Digital Audio* title is irreparably harming their magazine, *Audio*. They claim this will confuse the readers.

Before I went ahead with the name *Digital Audio*, I had the title carefully searched by one of the top copyright law firms in the country and got their assurance that they felt I had no conflicts with it. Since the term "audio" is generic for the field, and since there are and have been several magazines using the word "audio" in their titles for several years without any complaint, there seemed no reasonable potential for legal action.

If CBS is going to try to reserve the word "audio" exclusively for their magazine, one wonders at their lack of diligence in the past. One also wonders if it is really possible to reserve a generic word such as "audio" for a magazine title and retain exclusivity to its use. We're all familiar with *Personal Computing, Popular Computing, and Creative Computing*, as well as *Popular Electronics, Electronics Illustrated, Radio and Electronics*, and so on. Then there's *Modern Photography* and *Popular Photography*.

Is this a case of the CBS lawyers generating work just to justify their salaries, as has been suggested by some of the press? Or is this a case where CBS may feel threatened by Wayne Green preempting a new field, digital audio, which they now recognize as one which will soon grow into the largest aspect of hi-fi? Is it possible that CBS, by virtue of its unlimited funds for pursuing legal attacks on Wayne Green, may be using the courts to try to put Wayne Green out of business and put a nuisance out of the way? Considering the CBS dominance in the hi-fi market, am I fighting an anti-trust battle?

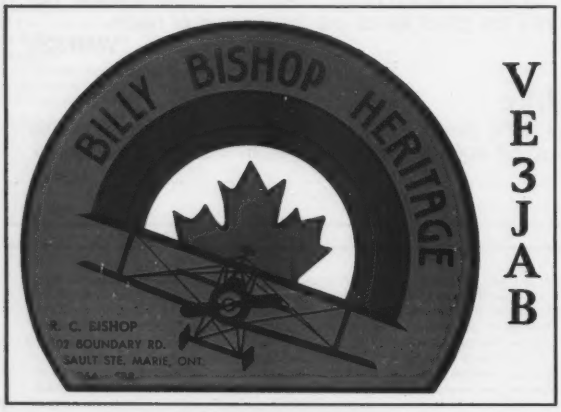
I remember all too well one lawsuit where the other attorney bragged that his organization had spent over a million dollars on the case against me—the $250,000 that one cost damned near sunk me.

Digital Audio is doing well and the field is growing quickly—about 100% per year. In addition to music, compact discs are being used for digital information—for instance, the Library of Congress index is coming out on two compact discs. This will be a priceless resource for small libraries.

Even though I don't see where CBS has a legitimate leg to stand on, their resources are so infinitely beyond mine that I could get crushed, so it's scary. And while our legal system may work okay much of the time, there are plenty of glaring examples of its fallibility. Money can buy injustice.

Will Wayne Green be flattened or bled dry by the CBS behemoth? We'll see.

Continued on page 64



QSL OF THE MONTH

To enter your QSL, mail it in an envelope to 73, 80 Pine Street, Peterborough NH 03458, Attn: QSL of the Month. Winners receive a one-year subscription (or extension) to 73. Entries not in envelopes cannot be accepted.

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TS-711A/TS-811A

Multi-function all-mode 2 m and 70 cm transceivers.

The TS-711A 2 m (142-149 MHz) and TS-811A 70 cm (430-450 MHz) all-mode transceivers are perfect base station units, designed to complement your present HF station. Both feature Kenwood's innovative D.C.S. circuitry. Built-in dual digital VFO's provide commercial-grade frequency stability through the use of a TCXO (Temperature Compensated Crystal Oscillator). The new fluorescent multi-function display shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, call sign code, and memory channel. 40 multi-function memories store frequency, mode, repeater offset and tone. They have programmable scan, memory scan, and mode scan. The Auto-mode function automatically selects the correct mode for the frequency being used. When a mode key is depressed, an audible "beeper" announces mode identification in International Morse Code.

The TS-711A/TS-811A also feature all-mode squelch, noise blanker, speech processor (SSB, FM), IF shift, RF power control, alert, and a unique channel Quick-Step tuning that varies tuning characteristics from conventional VFO feel, to stepping action when CH.Q switch is depressed.

Combine all these features with built-in AC power supply and a hefty 25 watts RF output power and you have your ideal base station.

Optional accessories:

• CD-10 Call sign Display • TU-5 CTCSS Tone Unit • VS-1 Voice Synthesizer • MC-60A Deluxe Desk Mic • MC-80 Desk Mic • MC-85 Desk Mic • SP-430 External Speakers • MB-430 Mobile Mount • PG-2J DC Cable

TS-670

TS-670 All-mode "Quad Bander."

The TS-670 "Quad Bander" is a unique all-mode transceiver that covers the 6 meter VHF band and the 10, 15 and 40 meter HF bands. FM operation may be added with the optional FM-430. Key features include dual digital VFO's, 80 memory channels, memory scan, and programmable band scan. Direct keyboard frequency selection allows you to enter a frequency to either VFO or to a memory channel using the 10-button key-pad on the front panel. The 2-color fluorescent tube display indicates frequency to the nearest 100 Hz (10 Hz modifiable) and includes LED indicators that signal the specific functions in use. The optional GC-10 general coverage receiver unit allows continuous tuning from 500 kHz to 30 MHz. The VS-1 voice synthesizer unit is another popular option available. All this plus IF shift, all-mode squelch, CW semi-break-in with side tone, narrow-wide filter selection, noise blanker, and R.F. attenuator make the TS-670 "Quad Bander" the next transceiver you should own!

Optional accessories:

• GC-10 General Coverage Unit, 500 kHz to 30 MHz • VS-1 Voice Synthesizer • FM-430 FM Unit • YK-88C 500 Hz CW Filter • YK-88CN 270 Hz CW Filter • YK-88A 6 kHz AM Filter • PS-430 DC Power Supply • KPS-7A DC Power Supply • MC-60A Deluxe Desk Mic • MC-80 Desk Mic • MC-85 Multi-Function Desk Mic • VOX-4 VOX Unit

More information on the TS-711A/TS-811A and TS-670 is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut St., Compton, CA 90220.

Specifications and prices are subject to change without notice or obligation.

NEW FROM MFJ

MFJ'S MOST ADVANCED RTTY/ASCII/AMTOR/CW COMPUTER INTERFACE HAS FM, AM MODES, LED TUNING ARRAY, RS-232 INTERFACE, VARIABLE SHIFT TUNING, 170/850 Hz TRANSMIT, MARK-SPACE DETECTION.

MFJ RTTY/ASCII/CW software on tape, cables for C-64/VIC-20.

MFJ-1229
$179.95

Engineering, performance, value and features sets MFJ's most advanced RTTY/ASCII/AMTOR/CW computer interface apart from others.

FM (limiting) mode gives easy, trouble-free operation. Best for general use, off-shift copy, drifting signals, and moderate signal and QRM levels.

AM (non-limiting) mode gives superior performance under weak signal conditions or when there are strong nearby stations.

Crosshair mark-space LED tuning array simulates scope ellipse for easy, accurate tuning even under poor signal-to-noise conditions. Mark and space outputs for true scope tuning.

Transmits on both 170 Hz and 850 Hz shift.

Built-in RS-232 interface, no extra cost.

Variable shift tuning lets you copy any shift between 100 and 1000 Hz and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII). Push button for 170 Hz shift.

Sharp multi-pole mark and space filters give true mark-space detection. Ganged pots give space passband tuning with constant bandwidth. Factory adjusted trim pots for optimum filter performance.

Multi-pole active filters are used for prelimiter, mark, space and post detection filtering. Has automatic threshold correction. This advanced design gives good copy under QRM, weak signals and selective fading.

Has front panel sensitivity control.

Normal/Reverse switch eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output.

Exar 2206 sine wave generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying for transceivers with FSK input.

Has sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack.

Kantronics software compatible socket.

Exclusive TTL/RS-232 general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. All signal lines are buffered and can be inverted using an internal DIP switch.

Metal cabinet. Brushed aluminum front. 12½x2½x6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95.

Plugs between rig and C-64, VIC-20, Apple, TRS-80C, Atari, TI-99 and other personal computers. Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

MFJ MULTI-FUNCTION TUNING INDICATOR

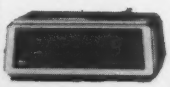
MFJ-1221
$79.95

Greatly improve your RTTY copying capabilities. Add a crosshair LED Tuning Indicator that makes tuning quick, easy with pin-point accuracy. **Add** mark and space outputs for scope tuning. **Add** LEDs that indicate 170, 425, 850 Hz shifts. Great for copying RTTY outside ham bands. **Add** sharp mark and space filters to improve copy under crowded/weak conditions. 170, 425, 850 Hz shifts. **Add** Normal/Reverse switch to check for inverted RTTY without retuning. **Add** output level control to adjust signal into your terminal unit. **Add** a limiter to even out signal variation for smoother copy.

Unit plugs between your tuner and receiver. Mark is 2125 Hz, space is 2295, 2550 or 2975 Hz. Measures 10x2x6 in. and uses floating 18 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

24/12 HOUR CLOCK/ID TIMER

MFJ-106
$19.95



Switch to 24 hour UTC or 12 hour format! Battery backup. ID timer alerts every 9 minutes after reset. Red .6 in. LEDs. Synchronizable to WWV. Alarm, Snooze function. PM, alarm on indicators. Gray/Black cabinet. 110 VAC. 60 Hz.

MFJ ELECTRONIC KEYER

MFJ-407
$69.95

MFJ-407 Deluxe Electronic Keyer sends iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

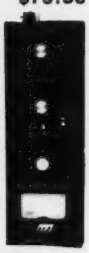
MICROPHONE EQUALIZER

MFJ-550
$49.95

Greatly improves transmitted SSB speech for maximum talk power. Evens out speech peaks and valleys due to voice, microphone and room characteristics that make speech hard to understand. Produces cleaner, more intelligible speech on receiving end. Improves mobile operation by reducing bassy peaks due to acoustic resonances. Plugs between mic and rig. 4 pin mic jack, shielded output cable. High, mid, low controls provide ±12 db boost or cut at 490, 1170, 2800 Hz. Mic gain, on/off/bypass switch. "On" LED. 7x2x6 inches. 9 V battery, 12 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ ANTENNA BRIDGE

MFJ-204
$79.95



Trim your antenna for optimum performance quickly and easily. Read antenna resistance up to 500 ohms. Covers all ham bands below 30 MHz. Measure resonant frequency of antenna. Easy to use, connect antenna, set frequency, adjust bridge for meter null and read antenna resistance. Has frequency counter jack. Use as signal generator. Portable, self-contained. 4x2x2 in. 9 V battery or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ PORTABLE ANTENNA

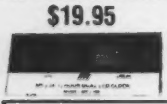
MFJ's Portable Antenna lets you operate 40, 30, 20, 15, 10 meters from apartments, motels, camp sites, vacation spots, nearly any electrically clear location where space for a full size antenna is a problem.

A telescoping whip (extends to 54 in.) is mounted on self-standing 5½x6¾x2¼ inch Phenolic case. Built-in antenna tuner. Field strenght meter. 50 feet RG-58 coax. Complete multi-band portable antenna system that you can use nearly anywhere. Up to 300 watts PEP.

MFJ-1621
$79.95

MFJ 24 HOUR LCD CLOCKS

$19.95 **MFJ-108**



$9.95 **MFJ-107**

Huge 5/8 inch bold black LCD numerals make these two 24 Hour clocks a must for your shack. Choose from a dual clock that features seperate UTC and local time display or a single clock that displays 24 Hour time. **Mounted in a brushed aluminum frame,** these clocks feature huge 5/8 inch LCD numerals and a sloped face for across the room viewing. Easy set month, day, hour, minute and second function. Clocks can be operated in an alternating time-date display mode. MFJ-108, 4½x1x2 inches; MFJ-107, 2¼x1x2 inches. Battery included.

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EDITED BY PERRY DONHAM KW1O

What Next?

A NEW DXCC COUNTRY has been unearthed by hungry DXers! The ARRL Awards Committee has voted 6–1 to accept the DX Advisory Committee recommendation that **ZC4 UK Sovereign Base Areas** on Cyprus be recognized as a separate country. When the Republic of Cyprus was established by treaty on August 16, 1960, Great Britain retained sovereignty over the Akrotiri and Dhekelia military bases. It's taken twenty-five years for anyone to notice! Submissions for ZC4 will not be accepted before June 1, 1985. ZC4 contacts made before August 16, 1960, will be credited to Cyprus. Unfortunately, all ZC4 contacts made after 1960 were not necessarily with Sovereign Bases. If your card specifically indicates operation from one of the bases, you're in luck. The DXCC desk will try to help in pinpointing the location of other ZC4 stations, and you can submit several cards for possible Sovereign Bases credit. If you already have a Bases card credited to Cyprus, you can resubmit it along with a valid 5B4 QSL and nail both countries in one shot.

Scholars

NINETEEN SCHOLARSHIPS have been announced by the **Foundation for Amateur Radio, Inc.**, a nonprofit organization with headquarters in Washington DC. Licensed amateurs may compete for one or more of these awards if they plan to pursue a full-time course of study beyond high school and are enrolled or have been accepted in an accredited university, college, or technical school. Most of the scholarships require that the applicant hold at least a General-class license. The awards range from $350 to $900, with preference given in some cases to residents of specific areas or students in a particular curriculum. You can obtain complete details about the FAR Scholarship Program by sending a letter or card, postmarked prior to May 31, 1985, to FAR Scholarships, 6903 Rhode Island Avenue, College Park MD 20740.

Go, Barry!

BARRY GOLDWATER K7UGA has introduced two nonbinding resolutions to the Senate relative to discriminatory and unreasonable local restrictions on home-satellite and amateur-radio antennas. Senate Resolution 35 deals with the satellite industry. Senate Resolution 36 urges the FCC to protect amateur-radio licensees against unreasonably restrictive land use and other state and local regulations which would render communications impossible or unreliable.

Chilling Tale

THE FASCINATING STORY of **Denise Allen VKØYL** has kindly been provided by "*73* International" correspondent Jim Joyce VK3YJ. According to Jim, Denise had her first exposure to amateur radio while working on Willis Island as a weather observer early in 1984. Guided by Graham VK9ZW, the island's Technical Officer, Denise devoured the study guides and code-practice tapes which were parachuted onto the remote island. After leaving Willis, Denise successfully passed the radio-license examination and began to prepare for her twelve-month tour of duty on Macquarie Island. Denise is equipped with a Kenwood TS-120S and will operate all bands (including six meters!) as often as possible. The six-meter gear is a Yaesu FT-680, a Lunar amplifier, and a Werner Wulf four-element beam. QSLs for contacts with VKØYL may be sent via Ken VK3AH at his *Callbook* address. Ken is the editor of *Amateur Radio*, the monthly magazine of the Wireless Institute of Australia, and also took the wonderful photograph of Denise pounding brass.

Map Happy

A NEW MAP of the South Pacific is available, published by the State of Hawaii. The map shows the location, capital, and political status of just about every island in the area. You can receive a free copy by writing to the State of Hawaii Information Office, Department of Planning and Economic Development, PO Box 2359, Honolulu HI 96804.

Auto Chew

IF YOU THOUGHT Doctor DX™ from Advanced Electronic Applications was great, wait until you've tried Doctor QSO™! Doctor DX is, of course, AEA's DX contest simulator for the Commodore 64. Well, Doctor QSO is just what it sounds like—a *rag-chew* simulator. The computer displays a 40-meter transceiver with a digital frequency display. You can change the frequency, volume, power output, and filtering by hitting a key. You can also toggle QRM and QRN in or out (a feature I wish my rig had!). Calling or answering a CQ will

Denise VKØYL giving her fist a workout.

net a contact, and you're off! I had a very nice chat with a fellow named Joe in Mississippi who was running an FT-901 that he had just purchased. We talked a bit about the weather and what rigs Joe had before he bought the Yaesu. We talked about antennas. Joe was S3 and fading when we signed, after promising to CU AGN SN. In some ways I really expect to hear Joe again on the bands—it was that realistic. Doctor QSO is also designed to be a Morse trainer. By selecting an option on the start-up menu, the operator can use the keyboard to send CW, and the sent characters are displayed on the screen, giving excellent reinforcement. As an introduction to ham radio, Doctor QSO lets a would-be ham talk with amateurs *without needing to know code*. It's a perfect way to pique someone's interest. I could go on and on, but let me just say that AEA has really outdone themselves this time. Look for a review of Doctor QSO coming soon in *73*.

Bird Watcher

A PAIR OF SOVIET BIRDS are on the bench in Moscow. RS-9 and RS-10 are slated for launch later this year. Both satellites use mode A (two meters to ten meters), and RS-10 will sport mode K. Mode K utilizes a fifteen-meter uplink and a ten-meter downlink. We'll have further details as they become available. Thanks to *Amateur Satellite Report* for this information.

Exam Updates

SEVERAL FCC ACTIONS concerning the Volunteer Examiner Program have occurred recently. A Notice of Proposed Rulemaking, PR Docket 85-21, has been issued in response to a petition by Phil Miller, who requests that the waiting period for retaking an amateur examination be reduced

from 30 to 7 days. Various comments have been received at the FCC proposing alternate waiting periods, including 15 and 26 days. The Commission feels that the waiting period is detrimental to the VE program and would like to delete the section of Part 97 that requires it. Three Orders concerning the program have been declared. First, the requirement to notify the FCC Field Operations Bureau thirty days in advance of an examination has been removed. Also, Volunteer Examiners are no longer required to list their address, license class, and license expiration date in Section II of Form 610. This is in response to a petition from the Dayton Amateur Radio Association that pointed out that the information was redundant and unnecessarily cluttered the form. Finally, the third Order dismisses a petition by Gordon Girth that requested several changes to the VE program, including a 3-region limit for VECs and expanded responsibilities for Advanced-class VEs. According to the Commission, "The petition is moot in part, repetitive in part, and requests several rule changes which are contrary to law. It does not warrant the initiation of a rulemaking proceeding."

CQ Sea Dogs

A RARE OPPORTUNITY to work an English Renaissance sailing ship is scheduled for April, May, and June. The *Godspeed*, a 68-foot vessel built to early seventeenth-century specifications, will carry amateur radio on board during her historic journey from London, England, to Jamestown, Virginia. The original *Godspeed* was one of three square-rigged ships that brought the first permanent English settlers to the New World in the winter of 1606. Current plans call for the *Godspeed* to depart London on April 30 and follow the settlers' six-thousand-mile route, which is expected to take around ten weeks. **Captain George Salley KA4FVB** will head a crew of twelve on this extraordinary journey.

G'Day Mate!

DICK SMITH ELECTRONICS is coming to the United States! Those of you familiar with the international scene will recognize the name as one of the largest and most popular electronics suppliers outside the States. The Sydney, Australia, firm was founded in 1968 by Dick Smith who, among other exploits, floated a fake iceberg into Sydney harbor on April Fool's Day and piloted his helicopter in the first solo round-the-world helicopter flight. Dick Smith Electronics plans to offer its own unique brand of business to the American hams, staffing the stores with electronics experts rather than stuffy salespersons. Dick Smith also supplies very nice screen-printed circuit boards for projects found in magazines such as *73*.

Ops at Fire Service Recognition Day (l to r): Harold Burba N6AXQ, John Kitchens NS6X, Marcy Bisson KG6FY, and Bill Bisson KF6XX.

Live Fire

BIG DOIN'S ARE COMING to Van Nuys, California. On May 11th look for **KF6XX** operating live from Los Angeles Fire Station Number 88, from 1700 to 2200 UTC. It's all part of Fire Service Recognition Day, an annual event designed to promote goodwill between local fire-fighting agencies and the public. KF6XX will operate 15- and 20-meter SSB, and a special QSL certificate will be available.

DX Dream

CLIPPERTON ISLAND will be back on the air early this month if all goes well. An international group made up of sixteen hams, headed by **Kip Edwards W6SZN**, will attempt to activate Clipperton between April 3rd and April 10th. It's been seven years since the island was last heard from. The game plan includes three stations running 24 hours per day on 10 through 160 meters using CW, SSB, and RTTY. The team hopes to be able to work SSB and CW simultaneously on the same band. And, if equipment can be obtained, they will try OSCAR and 6-meter operation. Of course the cost for such an adventure is phenomenal—about $3500 per person. If you would like to help finance the operation, contact The Northern California DX Association, c/o Rusty Epps W6OAT, 948 Kiely Boulevard, Santa Clara CA 95051. If the DXpedition doesn't come about, all contributions will be refunded. QSLs go to YASME, PO Box 2025, Castro Valley CA 94546. Cards received without an SASE will be QSLed via the bureau.

Giggers

THE INTERNATIONAL V/UHF CONFERENCE at this year's Dayton Hamvention will sport a fresh new format:

- The unique Noise Figure Contest will be held at the Hara Arena beginning at 6:00 pm on Friday, April 26th. The Arena will be closed to all other Hamvention activities so that any potential rf interference is avoided. Prizes will be awarded for the best designs from 144 to 2304 MHz.
- Technical forums will commence at 9:00 am on Saturday, April 27th, covering topics such as antennas, propagation, contesting, and dynamic range measurements.
- Antenna gain testing begins at 9:00 am on Sunday, April 28th, on a new range located behind the arena. Certificates will be awarded for the highest gain and best figure of merit and to the winners in the homebrew competition. No forums have been scheduled for Friday, so everyone will be free to explore the giant flea market.

Defense Defense

THE DEPARTMENT OF DEFENSE has expressed support of PRB-1, the ARRL request to the FCC for relief from restrictive antenna ordinances. In reply comments to the petition, DoD cited the Grenada action, the Coalinga earthquake, and the 1983 New Orleans flood as examples of the vital need for amateur-radio communications as a backup to federal and civil systems. According to DoD, "Continued success of the existing NSEP (national security and emergency preparedness) telecommunications plans involving amateur stations would be severely diminished if state and local ordinances are allowed to prohibit the construction of and usage of effective amateur transmission facilities."

Perryscope

COMING UP IN MAY is the issue many hams wait all year to receive: our annual **Antenna Extravaganza!** It's stuffed full of practical skywires to build, from UHF to 160 meters. You'll find reviews of antennas on the market and previews of antennas that aren't. And theoretical discussions that you won't be able to put down until the last sentence. On the lighter side, we have a bizarre tale from the Antlers Inn. We'll also show you how to perform a simple appendectomy using common items found in every kitchen! Don't miss the May issue of *73*. If you do, one of our boys will come and stick a pin in your coax.

TNX

SO MANY PEOPLE make QRX a success. This month the news was brought to you courtesy of *the W5YI Report* (electronic edition), the *ARRL Letter*, the *RaRa Rag*, *Amateur Satellite Report*, and all of you wonderful folks who supply your comments and stories. Don't forget to send in your news items, photographs, and ideas to QRX. Or drop by the *73* booth at the Dayton Hamvention...a story will buy you a cup of coffee.

When the FCC changed the rules, EIMAC was prepared for continuing HAM operations.

The FCC changed the allowable output power for linear amplifiers in amateur radio service. Hams can now run at 1500 watts PEP into an antenna. EIMAC was right there to meet requirements with its 3CX1200A7 tube.

Low-cost replacement for small spaces.

RF cabinets of many linear amplifiers currently use the EIMAC 3-500-Z tubes. The new 3CX1200A7 for design takes size into consideration and, by design, is recommended as a single, low-cost replacement for a pair of EIMAC 3-500-Z tubes for new amplifier designs.

General Specifications

The EIMAC 3CX1200A7 is a high-mu, compact, forced air cooled triode for zero-bias class AB2 amplifiers.

- 2.9" dia. x 6.0" long
- Plate dissipation: 1200 watts
- Glass chimney SK-436 available
- Standard EIMAC SK-410 socket available

More information is available on the new EIMAC 3CX1200A7 tube from Varian EIMAC, or any Electron Device Group worldwide sales organization.

Varian EIMAC
1678 S. Pioneer Road
Salt Lake City, Utah 84104
Telephone: 801 • 972-5000

Varian AG
Steinhauserstrasse
CH-6300 Zug, Switzerland
Telephone: 042 • 23 25 75

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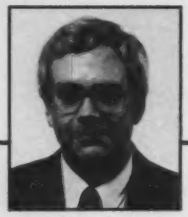

WHAT?

News from the Publisher

First of all, thanks to my Florida friends Orson and Doris Hubbard. When I was down there at Tropical-Hamboree time, without micro WP access when I needed it, they lent me your basic Smith-Corona just so I'd have a chance to start cranking this out before I came north. Also, hello to relatively-new Sunshine-State residents Carl and Yvonne Jillson. Their hearts and snow tires still belong to a little town in Vermont called Whitingham, regardless of what they say otherwise.

Second, thank you, Spenser, for coming forth again to share what you know about Ishmod and especially for breaking loose a look at your album.

Third, Miami's Tropical Hamboree at the end of January, one of the four or five best get-togethers in the country every year, should be renamed every year. I propose this right now. *73*'s Perry Donham KW1O and Jim Gray W1XU, who were actually there at the Flagler Dog Track site and reported, concur. 1985's edition should have been called the "Evelyn Gauzens Tropical Hamboree." You shouldn't have to be dead to have a hamfest—of whatever size—dedicated to you. It would be a nice surprise while you're busting your tail helping to put it together. People like Evelyn and Jack Mitchell from Dayton—to name two—deserve a little pre-mortem recognition.

Fourth, I was stunned by a comment made to me in Miami: "Good luck. It must be hard for an outsider from CW Communications to be in charge of *73*." Wrong, wrong, wrong, Chet. My fault, though, for not explaining before just who I am. Here goes: I was born in Albany, New York. I graduated from Columbia High School, East Greenbush, New York. I graduated from Dartmouth College, Hanover, New Hampshire, with separate majors in English and Geography. I've lived for at least two months in Compton CA, Salo SF, Madison WI, York Beach ME, Penn Yan NY, Toulouse FR, and (on) Chappaquiddick Island MA. I saw an ad in the *Boston Globe* in 1974: "Wanted: Marketing Assistant. Good opportunity to learn publishing business." I responded, happened to have an appointment at the right time on a right day, and was hired by Virginia Londner Green on the spot. I started work on November 18, 1974. Since then, I've been Assistant Editor, Managing Editor, and Executive Editor of *73*, as well as Editorial Operations Manager for all of the magazines published by CW Communications/Peterborough. If you have a "Hotline" from the mid-70s or an early issue of *Byte*, you'll find my name on those mastheads, too. Outsider, no. Newcomer, no way. *73* all the way, yes.

Fifth: About our ad rates. You, our readers, probably don't know what our advertisers certainly do, which is that we raised them beginning in January of this year. Next to *QST*, we have the highest. The reason for the increase was that I knew our paper costs would increase dramatically in '85. I wasn't about to kid anyone. I was honest about it, just as some advertisers were frank in suggesting exactly where *73* should be deposited and precisely what should be done with it once there. As we get into this spring and summer advertising-wise, I'm happy to report that more and more people are beginning to realize that they're dealing with an up-front magazine here whose goal is to promote amateur radio and whose readership is characterized (properly) as remaining steady through thick and thin and always being buyer-types. So...when you do call a number to inquire or make a purchase, please remember to mention *73*. That goes for when you walk into a store, too. You should also know right now that we don't make crazy advertising deals. When you see an advertiser in *73*, you know that he's paying top dollar to present his product prices to you.

Sixth, see you at Dayton. If you can make it there, please be sure to stop by our booth so that we can get acquainted. If you can't, we'll fill you in via our annual photo report anyway. Look for it in July, if not sooner.

Seventh, our mail is up 14% over last year at this time. Thank you very much. You people are going berserk and I want you to know that I personally love it. We're getting comments and commendations with regards to our 25th Anniversary efforts, as well as recommendations. We're getting constructive and destructive criticism from the USA and offshore; we're getting newspaper and magazine clippings about everything amateur radio is all about; we're getting you name it. No LBs so far. Believe me, everything is read and we do appreciate your input. I can't do this every month, but right now I'm pulling five letters out of the pile (mountain) at random to let people know that there is indeed life after letter-writing and that there is a far-out chance that someday the time they spend to send their thoughts might be recognized. THANK YOU VERY MUCH goes to Ray Belk NH6K (HI), Capt. Robert Conaughty K4OQ (FL), Blaine Hamrick WB5LSJ (TX), Ben Irvine N3CNH (PA), and Gerald Witte K6KMF (CA).

Eighth, I knew I was going to get in trouble last month by mentioning a few of the people who help provide you with *73*. I was right. It's the kind of difficulty that's nice, though, so here's another round:

- Nancy Cook got promoted out of our corporate financial arm to become *73*'s new Publisher's Assistant. If you can't reach me for some reason, please talk with Nancy. Nancy Cook is replacing Nancy Noyd, my long-time friend who retired in December after having spent five years working for *73* and me. I needed someone really smart and really nice and really versatile, so I made the corporate raid to get her. I'm not sorry; she's a super person and superb asset for *73*.
- And then there is Lindy Palmisano, Queen of Typesetters. Nice People—that's all there is to it.
- Welcome to Hope Currier, too, newest member of the *73* team (and another raid made). As Marketing Manager, Hope's biggest job at the beginning will be doing research (i.e., surveys) to make sure that we're bringing our readers and advertisers the kind of magazine that benefits them best. Her second most important task will be trying to figure out how to fit in with people who think that horses and dogs are human, that really good clam chowder is nectar, and that the pun thrives.

Jack Burnett

MPA

73 for Radio Amateurs is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 52 computer publications in 24 major countries. Nine million people read one or more of the group's publications each month. Members of the group include: Argentina's *Computerworld/Argentina*; Asia's *The Asian Computerworld*; Australia's *Computerworld Australia, Australian Micro Computerworld, Australian PC World* and *Directories*; Brazil's *DataNews* and *Micro-Mundo*; China's *China Computerworld*; Denmark's *Computerworld/Danmark* and *Micro Verden*; Finland's *Mikro*; France's *Le Monde Informatique, Golden* (Apple) and *OPC* (IBM); Germany's *Computerwoche, Microcomputerwelt, PC Welt, Software Markt, CW Edition/Seminar, Computer Business* and *Commodore Magazine*; Italy's *Computerworld Italia*; Japan's *Computerworld Japan* and *Perso ComWorld*; Mexico's *Computerworld/Mexico* and *CompuMundo*; Netherland's *CW Benelux* and *Micro/Info*; Norway's *Computerworld Norge* and *MikroData*; Saudi Arabia's *Saudi Computerworld*; Spain's *Computerworld/Espana* and *MicroSistemas*; Sweden's *ComputerSweden, MikroDatorn, Min Hemdator* and *Svenska PC World*; the UK's *Computer Management, Computer News* and *Computer Business Europe*; the US's *Computerworld, HOT CoCo, InCider, Infoworld, MacWorld, Micro Marketworld, PC World, RUN, 73* and *80 Micro*.

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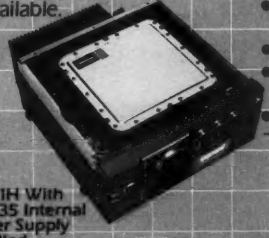
Whether your interest is simplex, repeater operation, or satellite work, the IC-471H 430–450MHz base station transceiver will give you maximum UHF operation.

75 Watts. The IC-471H provides 10 to 75 watts of adjustable power in all modes. This enables adjusting the drive level to a linear amplifier for higher power uses such as moonbounce. For a portable UHF station, the optional IC-PS35 internal power supply is available.



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Dateline: Dayton

It's almost here! Take an inside peek at the what, when, and where of ham radio's biggest bash of the year with 73's annual Dayton Hamvention sneak preview.

For the auto-racing buff, Indianapolis is the springtime place to be. For the horse-racing fan, Louisville is the mecca. Amateurs from around the world are no different as they set their sights every April on the midwest target of Dayton, Ohio, and the granddaddy hamfest of them all, the annual Dayton Hamvention.

Over 20,000 ham-radio enthusiasts invaded Dayton in 1984. That many and more are expected to be there April 26, 27, and 28, 1985. But why do so many amateurs turn out for this one event? And if someone wanted to attend, how would he prepare for this trip to ham-radio nirvana? In the next few paragraphs, I will answer these and other questions for you about the hamfest that some hams call "the center of the amateur-radio universe."

For any business venture to thrive, the first thing it has to have is a great location. That's Dayton's first big advantage. Maybe Dayton is not centrally located geographically, but as far as the population centers are concerned, Dayton is conveniently located. If your home QTH is anywhere in the eastern half of the great USA, you're probably just a day's drive from Dayton.

A second required ingredient for success is good organization, and that's truly an area where the Hamvention shines. Operated as a wing of the Dayton Amateur Radio Association (DARA), all responsibilities for the event are parcelled out to committees that meet the year round. They evaluate the previous year's event in May, study possible changes during the summer months, and by fall everyone knows exactly who is doing what in preparation for the next Hamvention.

Every job is covered. From the job of flea-market chairman, managing over 1,500 spaces available outside, to that of chairman of inside activities, placing over 200 anticipated new-equipment dealers in the right location, all of the responsibilities are assigned. That may seem like an extensive amount of advanced planning, but for a show this big to be produced by volunteers to satisfy the wishes of over 20,000 hams, it's necessary.

Okay, you're impressed by the mechanics, you say, but what can you expect to see and do at the Hamvention? I guarantee you that there is more to see and do at the Hamvention than you'll have time for.

For this and other obvious reasons, it's a good idea to plan how you want to spend your time at the 1985 Hamvention, and the trick is to do your planning as soon as you enter the main doors of Hara Arena where you'll receive your Hamvention program. Take a moment to sit down with the book, see what's on the 1985 schedule, and note the forums and meetings you want to at-

Heading to Dayton? Lots of amateurs are already planning their annual trek to the Ohio city that is fast becoming "the center of the amateur-radio universe."

Hara Arena is the focal point of the Dayton Hamvention, providing room for over 200 indoor displays, daily forums, and the Hamvention's 1,500-space flea market.

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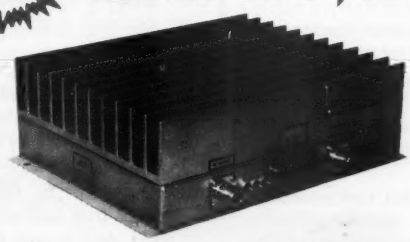

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"When You Buy, Say 73"

As soon as the doors opened on Hamvention 1984, the Hara Arena was filled with busy shoppers looking for that certain piece of dream equipment.

Inside exhibits were popular with the 1984 crowd. This was just one of three large arena areas set aside for the over 200 dealers.

tend. That is no easy task considering that almost every topic related to ham radio is touched upon during the weekend, so feel free to be very selective. Inbetween planned discussions, you can make your sweeps through the flea market and indoor displays and, hopefully, see most of what the Hamvention has to offer.

Just what will you see? In years past, I have found that dealers like to have their newest products debut at the Dayton Hamvention to take advantage of the large crowd of prospective customers. After all, it's a basic advertising axiom that the more people who see your products, the more sales you'll make and the more word-of-mouth advertising you'll generate. When the prototype synthesized HT came on the scene, it made its first public appearance at Dayton—so watch for the new and the unusual.

Besides the newest equipment, you'll also be seeing some of the lowest prices ever offered on amateur-radio gear. You might call it the "Dayton Discount," but I've found prices there to be consistently lower—again because of the large number of buyers, for that can turn small profit margins per item into large total profits.

I can't guarantee that you'll find the lowest possible price on that receiver you've been dreaming about, but I can say that whenever I want to buy something, I shop Dayton first. Yes, I'll pay $22.00 a box for ten floppy disks at my local computer store, but I will also stock up by buying a few boxes at the Dayton flea market where they're going for $16.00 a box; that's just knowing a bargain when you see it and taking advantage of it.

Amateur equipment is not all you'll see at Dayton. During the 1984 Hamvention, I saw a variety of displays, from portable Halon fire extinguishers to recruiters telling amateurs about a career in the Central Intelligence Agency. (But don't ask anyone where the CIA booth is located; it's a secret.)

HINTS

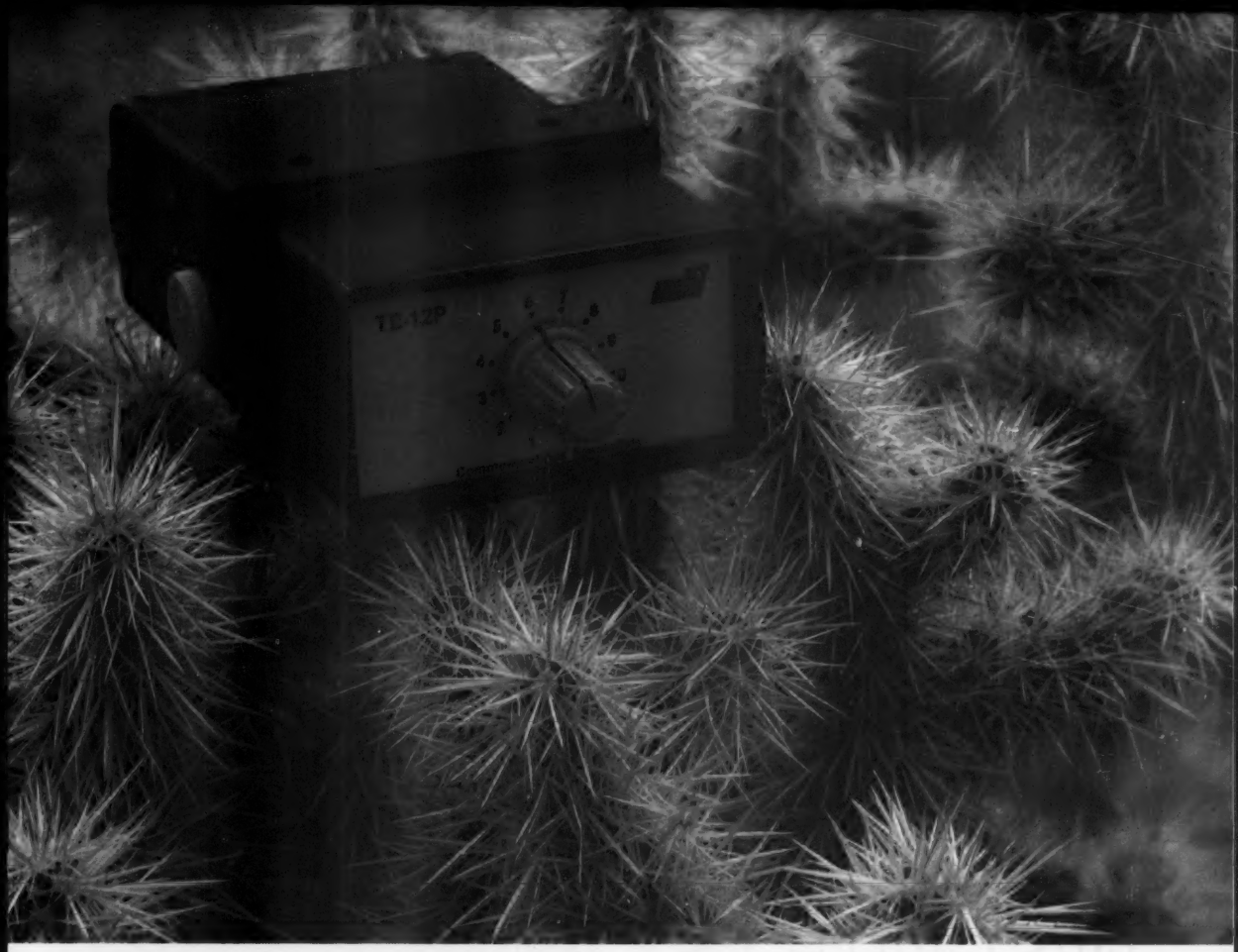
- Secure room reservations for the nights of April 26 and 27, and if you plan to arrive on Thursday, include the night of April 25 in your reservations.
- Get the group together so you'll know who plans to go, then you can figure on how many cars you'll need to make the trip.
- Save money by ordering your registration tickets in advance, and at the same time order your flea-market permits, if needed.
- Talk to the boss and arrange for time off on the appropriate dates—April 26 plus any days needed for travel.
- Save your money to pay for the trip and whatever equipment you've been wanting. Convert most of that money into traveler's checks which are readily accepted by dealers at the Hamvention. Don't expect a dealer to take your personal check.
- If you plan to sell items in the flea market, look around the ham shack for equipment you can bear to part with and put a fair price on it. Then be ready to watch it go when you put it on display at the Hamvention flea market.
- Make and carry a list of things you want to buy while at the Hamvention. You'll be looking at so much equipment, you could forget what you came to Dayton to get!

So there's really no telling what you'll see at the 1985 event. I expect the latest in amateur-radio gear to be on display—from antennas and towers to transmitters and computers—but you might also find a version of an old radio that only your grandfather could remember. It's the diversity that is one of the appeals of Dayton, so keep your eyes open as you wander the aisles. Much of what you'll see can be seen only at Dayton.

Preparations

Now that I have you eager to attend the 1985 Hamvention, you're probably wondering what preparations you should make prior to departure for the amateur-radio heaven known as Dayton. Here's the answer, and be sure you pay attention because it gets kind of complicated.

With part of the show inside and a big part outside at the 1,500-space flea market, you need to be ready for any type of weather Mother Nature happens to have on hand for that last weekend in April. And as any Dayton resident can tell you, the weather can change from year to year and from day to day, from sunshine and 70° F to rain and 40° F with a



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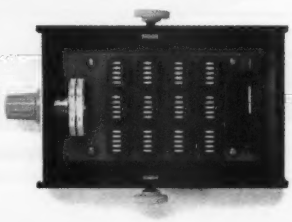

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74.4 WA	91.5 ZZ	110.9 2Z	136.5 4Z	167.9 6Z	
77.0 XB	94.8 ZA	114.8 2A	141.3 4A	173.8 6A	
79.7 SP	97.4 ZB	118.8 2B	146.2 4B	179.9 6B	
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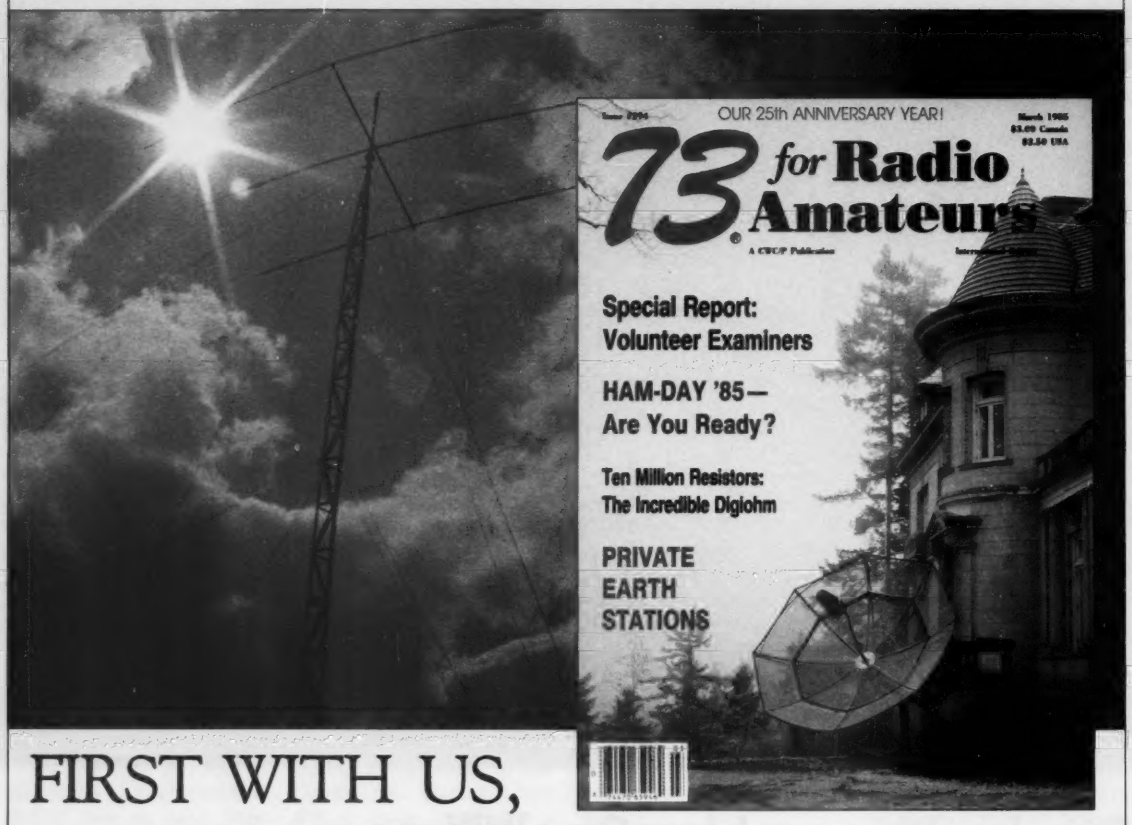

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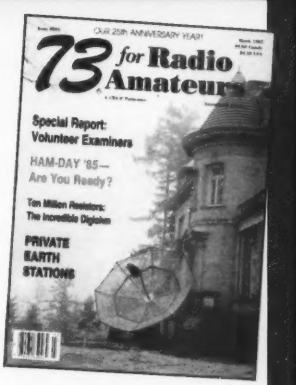

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possibility of ice, snow, and even wind warnings on area lakes. So be a good scout and be prepared for dressing with the changeable weather in mind.

Start with a short-sleeved shirt and a jacket, and if it gets warm, you can trim down to a T-shirt. But keep the heavy coat and long underwear nearby in case the mercury goes the other way, and always be ready for rain by having an umbrella or raincoat handy. In just the last three years, we've had clear and warm, cold and wet, and, in 1984, simply gorgeous weather. In 1985, the umbrella salesman could become the most popular guy in the flea market—or he could go broke.

GENERAL INFORMATION

- Hamvention information—(513)-433-7720
- Flea-Market Hotline—(513)-223-0923
- Flea-market setup day—Thursday, April 25. Registration tickets and flea-market permits must be shown together for admission to the flea market.
- Deadline for ordering tickets and flea-market permits—April 12.
- Prices—registration tickets: in advance $8.00, at door $10.00; flea-market spaces $17.00; alternative activities $6.00; banquet tickets: in advance $14.00, at door $16.00.
- Talk-In Frequencies: 146.94, DARA repeater. Other available repeaters: 146.31, 224.38, and 224.94.

1985 HAMVENTION OFFICERS

General Chairman—Jack Mitchell AA8Q
Assistant General Chairman—Jim Simpson WB8QZZ
Flea-market Chairman—John Grody WB8TEK
Advance Registration—Paula DiGennaro KA8HQJ
Registration Chairman—Cathy Grody
FCC Testing—Judy Frye KG8P

Flea Market

Speaking of the flea market, the group I go with every year from West Memphis always rents a space or two to sell some extra gear and to serve as a gathering point for the entourage. Why, even some of the hams attending from nearby Memphis know that they're welcome to visit and rest a spell at the West Memphis exhibit. Now that you're planning your trip, you might include the cost of a flea-market space in your Dayton budget.

The spaces are $17.00 this year, up from $15.00 last year, but that pays for use of the space for the entire Hamvention weekend. Even with the slight price increase, the flea-market space is still a great idea for your group—and also a good way to pay or help pay for the trip since you can sell some of your used equipment.

Keep in mind that flea-market permits are available only in advance (four is the limit) and that all spaces are numbered. This change took effect last year and was welcomed by all involved since it allowed the flea-market vendors to set up for the show in advance, eliminating the horrible practice of having flea-market vendors waiting in line overnight for a space—and in some cases waiting two or three days. The ease of setting up last year made for a better Hamvention all around since vendors weren't tired from waiting in line all night and were in more of a mood to bargain. That made for a money-saving situation for the customers. The change was such a success last year that it has been incorporated permanently into the Hamvention plans.

Just remember that if you plan to sell in the flea market, you must order your spaces in advance, and if you order your registration tickets at the same time (at the price of $8.00), you can save money over the at-the-door price of $10.00. So save yourself some time and money and order in advance.

If you have any other questions about the flea market, call the Hamvention Flea-Market Hotline at (513)-223-0923. You might even get to talk to the flea-market chairman, John Grody WB8TEK, or his lovely wife, Cathy, who is the Hamvention's registration chairman.

In a recent interview, Grody asked me to remind Hamvention attendees of flea-market rules: No bikes, roller skates, or motorized skateboards will be allowed in the flea market, and, if a vendor plans to use a gas heater or stove while in the flea market, remember that those devices are potentially dangerous—especially when used in a crowded area—and for their safety and the safety of others, it is a good idea to bring along a dependable fire extinguisher.

Travel Plans

Grody also pointed out that the main section of Interstate 75 through downtown Dayton is going through a two-year recon-

Flea-market vendors and customers fill the aisles in this partial view of the 1984 Hamvention flea market.

Flea-market displays vary with the vendors, but with over 20,000 people attending, the prospective buyer is always at hand during the three-day sale.

struction project, and folks who normally use that north-south artery might want to have an alternate route in mind.

If you are driving around 500 or 600 miles to Dayton with a group of fellow hams and you plan to share the room expenses, you can count on the trip, meals included, costing you about $100. That approximate figure can vary depending on the number in your group, your mode of transportation, and selection of restaurants versus fast-food establishments, but I have found the $100 price tag to be a consistent starting point when it comes to computing expenses. Purchasing a ticket to the annual Hamvention banquet will also change the expense total, but I can tell you from experience that it is money well spent. Going to the banquet was one of the highlights of my 1984 trip to Dayton, so make it if you can.

It's a common sight to see four potential buyers looking over one piece of equipment for sale during the Hamvention.

In the area of securing appropriate accommodations, I can take pleasure in telling you that this sometimes complicated task can be handled easily through the Hamvention's Housing Bureau. If you have a copy of the program from 1984, you'll find an application for 1985 hotel reservations on page 59. If you don't have a copy, write to Dayton Hamvention Housing, 1980 Kettering Tower, Dayton OH 45423-1980. Be sure to get your requests in early.

If you've read this far, I'd say you have a pretty good idea of what Dayton is all about and how to plan for an enjoyable trip to the 34th annual Hamvention. But reading a description can hardly be compared to actually being there and experiencing the event for yourself. It's truly a once-in-a-lifetime experience that I have been lucky enough to enjoy for many years and, I hope, will be lucky enough to continue to enjoy for many years to come. I have no doubt that you'll feel the same way once you attend—and then you'll know why folks who make the Hamvention once go back again and again.

So get the gang together, hop in the car, and head for Dayton, Ohio, April 26, 27, and 28, 1985, to see what's new in ham radio. And if you happen to have the low-band rig in the car, give us a shout on 7.171 MHz. We'll talk about the Hamvention. See you there! ■

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Hear, Hear!

Stop settling for second-rate signals from OSCAR. You've really no excuse. W6IOJ's low-noise preamp is easy to build and includes all the circuits necessary for alignment. So do it!

Operating OSCAR 10 made me appreciate the difficulties one can have in receiving threshold signals in the two-meter band. From my location, and I think it is fairly typical, I can see elevated locations having TV, FM, and aircraft-control transmitters that all saturate my location with high-energy VHF radiation. This is in addition to cable-TV leakage.

Using my original preamp, I received many strange signals in the OSCAR 10 bandpass. The interference varied greatly from time to time, and during some periods it made the receiver inoperative. The greatest offender was the TV station at the receiver image frequency (I could detect the signal with no antenna or preamplifier—simply stray pickup into the double-balanced mixer). There also were many cross-modulation-type signals that I couldn't identify. The old preamp used a typical low-Q input-matching circuit and a fairly sharp tuned-output circuit for discriminating against the mixer image.

This article describes a low-noise preamp that solved my problems. It has a gain of over 20 dB. In addition, the description includes a very handy noise source for tuning up and optimizing receiver performance. It generates power-line-type noise that can be varied in amplitude and keyed. The noise character is such that it can be used with any type receiver, including the SSB/CW receiver. Both assemblies are simple do-it-yourself projects. All parts can be bought from Radio Shack.

Etched PC-board circuitry is avoided in the fabrication by using small PC pads glued to the primary PC mounting board with ordinary household cement. Components are soldered directly to the pad foil for interconnection and support. If a mistake is made, simply lift the pad with a knife and make the necessary change. The method is simple and effective; I found no disadvantages in its use for this particular application.

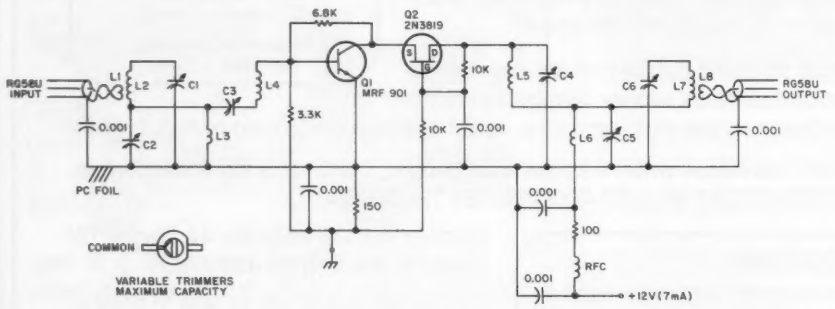

Fig. 1. Schematic diagram of the preamplifier. Numbered components are identified below. Fixed-value resistors are carbon composition, 1/4 W. Fixed-value capacitors are disc ceramic, 50 WV. Numbers in parentheses identify Radio Shack numbers.
C1 through C6—5–60-pF miniature trimmer (272-1340)
Q1—MRF901 (276-2044)
Q2—2N3819 (276-2035)
L2, L4, L5, L7—5 turns no. 14 solid wire, 3/8 inch dia., 7/16 inch long (formed on 1/4-inch-dia. rod)
L3, L6—3 turns no. 14 solid wire, 5/16 inch dia., 1/4 inch long (formed on 3/16-inch-dia. rod)
L1—2 turns no. 24 plastic-insulated stranded hookup wire formed tightly over the end of L2
L8—1 turn no. 24 plastic-insulated stranded hookup wire formed tightly over the end of L7
RFC—approximately 30 turns no. 30 wire on 1/2-W, 1k resistor (two layers)

Preamp Circuit

Choosing the preamp active device becomes easy when you restrict your choice of parts to those which are readily available. The only one that is competitive from the low-noise consideration is the MRF901. Actually, it is not a bad compromise, as the typical noise figure is less than 1.6 at 2m. It has two disadvantages as compared to a good FET: One is that bipolar amplifiers are more subject to overload, and the second is that it is difficult to stabilize

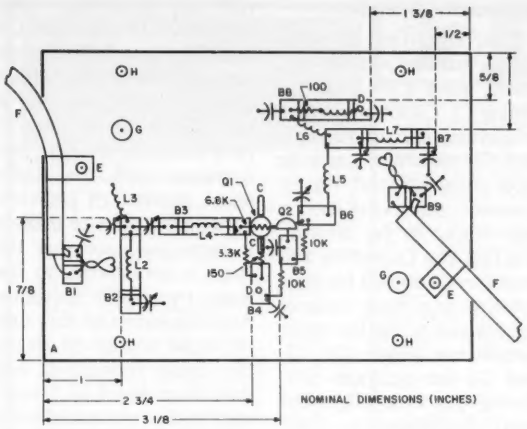

Fig. 2. Layout details.

A—PC mounting board, 4 × 5-3/4 inch, Cu one side

B—Parts-mounting pads, 1/16-inch PC board, Cu either one or both sides (preferably glass insulation). 1/4-inch-wide separate pads formed by filing 1/16-inch-wide grooves to remove Cu. Glued to mounting board with household cement. Length in inches: B1—1/2, B2—1-1/4, B3—1-1/4, B4—1/2, B5—3/8, B6—1/2, B7—1-1/2, B8—1-1/4, B9—1/2.

C—Q1 emitter connections. No. 14 solid wire shaped as tight U, 1/4 inch long, soldered to mounting board.

D—Power-supply connections. Wires connected through holes in the mounting board, reamed on the foil side to prevent shorting of the wire to the PC foil.

E—Cable clamps

F—RG-58/U input-output cables

G—PC-board mounting holes. Require insulated shoulder washers.

H—Shield mounting holes

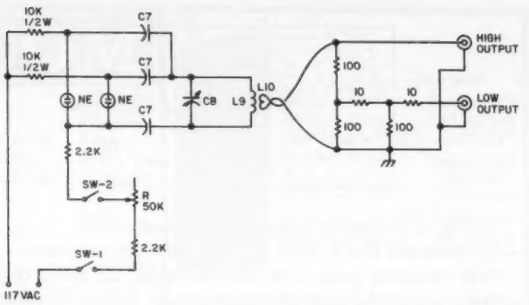

Fig. 3. Schematic of the power-line noise source. Numbered components are identified below. Fixed-value resistors are carbon composition, 1/4 W unless otherwise noted. Numbers in parentheses identify Radio Shack numbers.

R—50k potentiometer (271-1716)

SW1—On-Off switch mounted on R (271-1740)

SW2—Push-to-break switch (275-1548)

NE—Ne-2H neon lamps (272-1102)

C7—0.01 uF, 250 WV (272-1051)

C8—5-60-pF trimmer (272-1340)

L9—6 turns no. 14 solid wire, 3/8 inch dia., 1/2 inch long (formed on 1/4-inch-dia. rod)

L10—2 turns no. 24 plastic-insulated stranded hookup wire (formed tightly over the center turns of L1)

Output connectors—Female BNC chassis type (278-105)

Box—4 × 2-1/8 × 1-5/8 inch (270-239)

when used with narrowband circuitry.

The hybrid cascode circuit shown in Fig. 1 optimizes the MRF901 performance while addressing these potential problems. The cascode 2N3819 FET common-gate second stage accommodates most of the voltage swing, improving the bipolar overload performance. Also, its broadband low-impedance load to the MRF901 reduces the instability tendencies. Stability is further encouraged by connecting the MRF901 emitter leads and all other components referenced to common directly to the PC foil. The one disadvantage of this method is that it becomes necessary to isolate the foil from dc ground when mounting the assembly. The input-output inductive coupling provides the required cabling isolation. Operating current is established mainly by the MRF901 bias voltage. The bias voltage has been set to make a collector current of 7 mA, the maximum current allowable that will maintain an optimum noise figure.

The input filter, while not a particularly good filter when the preamp is trimmed for optimum signal to noise, provides some overload protection to the MRF901. The output filter is a narrowband T network made up of tuned circuits L5-C4 and L7-C6, adjusted for critical coupling by C5. The T-filter low-pass characteristic is discouraged by adding the high-pass inductor, L6; its inductance value is established to not alter the critical coupling value of C5.

Preamp Fabrication

The layout indicating nominal dimensions is shown in Fig. 2. The parts are mounted on the PC board using the glue-down pad technique mentioned earlier. Exceptions to this are the MRF901 emitter and collector connections. The two emitter leads are raised the height of the PC mounting pad thickness using copper pads made from no. 14 solid wire. (This wire is a common house-wiring size and can be purchased at most hardware stores.)

The collector lead is carefully bent upward, the 2N3819 source and 6.8k resistor connections soldered to it without an intermediate connecting method. This avoids possible stray capacitance, a parasitic-oscillation preventive measure. In bending the MRF901 lead, do not apply any stress on the lead-plastic interface (clamp the lead with long-nose pliers at that interface and bend the remaining portion of the lead).

The layout is not critical. First, mount the MRF901; once that is complete, simply glue the mounting pads one at a time while mounting the parts (no need to wait for glue drying). L2-L4 and L5-L7 are mounted at right angles with maximum separation to minimize mutual coupling. The power-supply feedthrough holes in the mounting board require reaming of the copper before gluing B4 and B8 (hand ream with a 1/4-inch drill). Means of mounting the board without shorting the foil to power-supply ground is required. Two holes having fiber shoulder washers are used for that purpose.

Noise-Source Circuit and Fabrication

The noise source makes use of the noise generated from a gaseous discharge, in this case Ne-2H neon bulbs. At the receiver output it sounds identical to power-line noise. Referring to the circuit diagram, Fig. 3, two Ne-2H neon bulbs are powered directly by 117 V ac

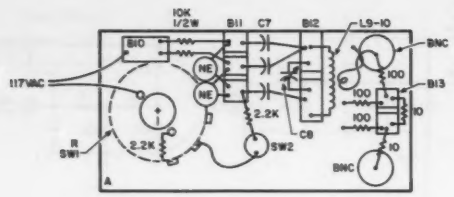

Fig. 4. Power-line noise-source layout details.
A—PC mounting board, 3-1/2 × 1-3/4 inch, Cu one side
B—Parts mounting pads, 1/16-inch PC board, Cu either one or both sides, 1/4-inch-wide separate pads formed by filing 1/16-inch-wide grooves to remove Cu. Glued to mounting board with household cement. Length in inches: B10—1/2, B11—3/4, B12—1, B13—1/2.

through current-limiting resistors. The circuit includes a potentiometer to vary the current/noise output and a push-button switch (normally on) to manually switch the bulbs. A tuned circuit is used for coupling out the 146-MHz noise component. Blocking capacitors completely isolate the ac line from the output circuitry. The link-coupling output provides a direct-connected high output and a second low output through a 16-dB pad. The low output is close to a threshold signal (approximately 6 dB above receiver noise with minimum R) and the pad ensures a 50-Ohm source impedance.

The fabrication method is identical to that used in the preamp. The detailed layout is indicated in Fig. 5. The circuit board is held into the mounting-box faceplate by the panel parts (BNC connectors, SW2, and R1).

Alignment—Operation

The amplifier is completely stable without the shield; leave it off. Start by setting C1, C3, C4, and C6 at minimum, C2 mid-range, and C5 maximum capacity (note capacitor inset, Fig. 1). Connect the noise-source high output to the preamp, and first trim C4 and C6, followed by C1 and C3 for maximum output. Next connect the preamp to the low-noise output and juggle C1, C2, and C3 for optimum S/N. During this final alignment keep your finger on SW2, switching the noise source on and off while making the adjustments. Considering the output filter, I found that not much is lost by leaving C5 at maximum capacity, possibly a 10% gain increase by juggling C4, C5, and C6. Selectivity will be degraded if the capacity of C5 is less than required for critical coupling.

My preamp measured 26-dB gain. However, the gain will vary depending upon the characteristics of Q1 and Q2. I have had no problems with the MRF901. It's a consistent performer and it will take a lot of abuse. I have found inconsistent performance with the Radio Shack 2N3919s. If your amplifier gain is low or if there is some evidence that the stage is contributing to the noise, try another transistor. As a simple test for this, turn the noise source off (leave the cable connected) and then short the C1-L2 junction to the mounting-board foil. The noise should decrease at least 6 dB.

Some will raise their eyebrows looking at a bipolar circuit and an input filter, but the consequences are small. I have had no trouble receiving OSCAR 10 signals, even with the bird on the horizon. My antenna is a home-built four-element yagi with no cross polarization. ■

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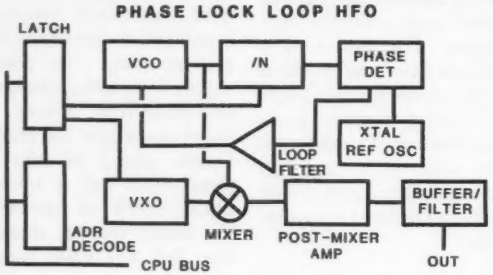

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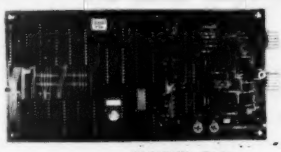

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IC-3AT 220 MHz, TTP	299.95	239.95
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BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
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BC-35 Drop in desk charger for all batteries	69.00
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LC-11 Vinyl case	17.95
LC-14 Vinyl case for DIx using BP-7/8	17.95
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Accessories for both models	**Regular**
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Ishmod's Journal

What really happened on that lonely, uncharted rock? And what was the eerie glow?

In April of 1984, we presented (or at least tried to present) the story of Ishmod's Journal. As though still troubled by some unseen force, the story ran afoul of production problems and was abruptly abbreviated in its presentation. It was to be continued on a subsequent page, and to this day some of us don't know what happened.

Last April, when we saw the printer's proofs we were dumbfounded. Concern and curiosity turned into rage; fingers were pointed, the telephones were glued to our ears. We had no time to lay out the issue again, and besides, we couldn't find the missing galleys. Then there was the problem with the errant reference to a nonexistent page. Typesetting had a mysterious glitch that wiped out not only the Ishmod file but also our on-line author information. The hard copy provided by author Spenser Whipple was not in the folder, and Whipple was out of the country again.

We swallowed hard and figured we could reconstruct the missing material and get it into an upcoming issue. Well, it's taken a year. Like the journal itself, the telling of this story also seems to invite the unexpected and unexplained. We hope that with this effort Ishmod's story and its impact on mankind will be at last understood. The story begins with the last (and unfinished) sentence on page 65 of the April, 1984, issue.—Eds.

The rocks of the island exhibited the incredible capacity to alter the infundibuliform...I'll try to explain.

Once the five DXpeditioners left the calm water of Chatrapur on the morning of June 25, their main task was to convince the captain of the chartered boat to follow Ishmod's directions. The captain had sailed these waters for nearly 40 years and couldn't accept the fact that there was any piece of land waiting at the coordinates on the crude map laid out before him. Still, Ishmod and the others *had* managed to scrape together the fare that had been settled on after considerable haggling. The captain would indulge their foolish pursuit because he was being paid to do so. The day loomed bright and promising. Ishmod double-checked his fixes and assured the captain that they were on course.

Once underway and clear of the rocks and shoals near land, a battery-powered all-band portable radio was unpacked. If they were going to spend a week on the air, they hoped band conditions would be optimum. The odd thing was that the longer they traveled, the stronger band conditions seemed to get—not just the lower frequencies but across the entire spectrum. No matter where they tuned there was activity, and all this on a short telescoping whip. They

figured they were in for some great operating. Little did they know what they really had waiting for them.

Ishmod figured that they would make land about noon. At 11:30 Dinpoor and Navi began to scan the horizon with borrowed binoculars. By 12:30, all were a little worried. And then they saw it; in fact, they had almost rammed it. Ishmod and the others were all pointing. The captain cursed, jammed the boat's throttle into reverse, and flicked at his stubble, unable to believe what he saw.

They made their approach on the southern or leeward side and glided up to an uncharted, solid-rock island in the Bay of Bengal. They scrambled up the rocks with a whoop. Ishmod took four sightings on the stable footing, made his calculations, and proclaimed their triumph. The captain yelled to them to get their gear unloaded so he could get back before dark. Ishmod went over a copy of the chart with the captain while the others carried their equipment and supplies ashore. The captain told them to be ready one week from the day. If the weather was bad, he'd be there the following day. Soon, Ishmod, Putra, Hator, Dinpoor, and Navi were quite alone.

Using his crude map, Ishmod began to walk the island, his friends chattering along behind him. They all thought they'd check out their new home before setting up the two base camps at the extreme ends of the kilometer-long monolith. There appeared to be no vegetation except for the marine growth near the water's edge, and there was little of that. Although it would matter a great deal later on, no one seemed to notice the lack of fish, crabs, or barnacles near the shore. Luckily, they had planned for the worst and had brought along plenty of fresh water.

There were several things about the island that struck Ishmod as odd, yet in his enthusiasm he had brushed them aside. The island appeared to be solid rock, worn smooth, he supposed, by the action of water and the grains of sand suspended in it. There were some rather curious depressions at about the midpoint of the island, trailing off to the water in the north. The rock of which the island was composed had a definite metallic sheen when the sun struck it just right. In fact, as they walked, the island seemed to blend into the surrounding water, which perhaps could have accounted for the island's lack of visibility. According to the oceanographic reference he'd carried with him, they had arrived at nearly high tide and still had about a meter and a half between their feet and the water. Unless there were to be a storm they'd be dry, he thought.

It took about two hours to make their way around the entire island and return to where they'd left their supplies and radio equipment. Navi turned on the portable radio again to check conditions. The bands seemed strangely quiet now. The only signal he could copy at all was a maritime mobile. The freighter was about 1000 miles off the western coast of South America on its way to Easter Island.

They divided up the radio equipment, wire antennas, tents, sleeping bags, and food and water. Dinpoor and Navi would set up the 40- and 80-meter station at camp 1 at the east end of the island. Hator and Putra would set up the 20-meter station at camp 2 on the west end. Ishmod planned on rotating between the two as needed, although he would sleep in Hator's large tent. Setting up the camps did not go well. Dragging the gasoline-powered generators to opposite ends of the island was very difficult and many trips had to be made. The tent pegs were worthless. They couldn't be driven into solid rock. Finally, by using some of their supplies stacked at the corners of the tents, they managed to at least make some shelter.

It was very dark before they could stop to have some supper and talk about the beginning of their adventure. With the gasoline generator running in the background and with the light of a single camp lantern, the five decided to tune the bands just once before splitting up and getting some sleep. They turned on the Hammarlund HQ-170 they'd been lent from the radio club at the university and began to scan across the 75-meter band.

While their modest antenna consisted only of a dipole suspended about 4 meters above the island's surface by primitive wooden tripods, they had expected more than the dead quiet that greeted them. Navi went out to check the ground connection to the length of copper wire they'd thrown into the water. He tightened the wing nut another half turn and started back to the tent. Off to the north he thought he could detect a faint silvery glow, but it seemed to fade the longer he looked at it.

Back inside the tent, as Putra slowly rotated the main tuning dial, they heard first one voice and then another answering; both were speaking in what sounded like Slavic. Then almost together they realized that the voices they heard seemed not to be coming from the speaker in the tent but from

Continued on page 225

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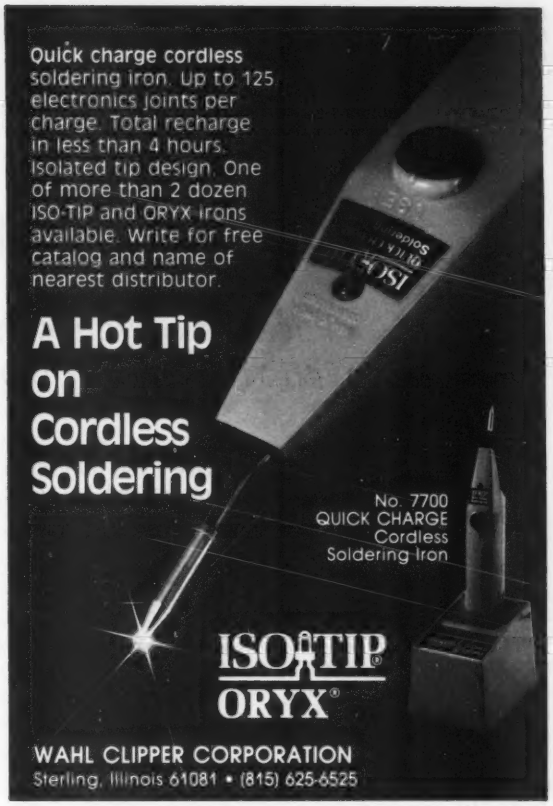

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Don the Dayton Hat-tenna

Put a cap on your communication problems with a rubber duck that's heads above the rest.

Your HT and mine probably have a few things in common. For one, there is the belt clip, either on the HT or its leather case. Its purpose, of course, is to leave your hands free for more important things like scrounging through goodies at a hamfest or when using a speaker-mike. Very convenient.

Another common item is the ever-present rubber ducky. Its compact design is a natural for the HT. With the HT on your belt, however, the antenna location can make it very difficult to hear others and be heard yourself. Very INconvenient! Many of us have utilized the popular Statue-of-Liberty mode of operation in a last ditch effort to pull in that weak signal or make ourselves heard on that distant repeater.

A couple of years ago, while at the Dayton Hamvention, the need for a practical solution to this problem became quite apparent. Ed WB3LHG, my good friend and co-hatcher of strange ideas, had fabricated a quarter-wave whip using stainless steel wire and a BNC connector. When used on the hand-held it was very effective both as an antenna and as a means of clearing a path through the crowded aisles. (If you've ever taken a stroll through the Hara Arena during the hamfest, you'll get my point!)

During an exchange of ideas, we saw a few people wearing hardhats, presumably to protect them from the sun or rain—it *has* been known to rain at Dayton! These were similar to the safety hats worn by construction workers except for one important difference. On top of the hat, seeming to tower above everyone and everything, was a rubber ducky! A great idea, but we decided it might be a little too uncomfortable. Besides, I didn't think hardhats were too easy to come by.

The logical alternative was to change from a hardhat to a soft cap, and after a little experimenting, I went ahead with that.

I found that the antenna could be supported easily by using brass shim stock as a base to which could be soldered a BNC connector. This also served as an effective ground plane. Punching a 3/8" hole where the two

Photo A. WB3LHG putting a Hat-tenna through its paces.

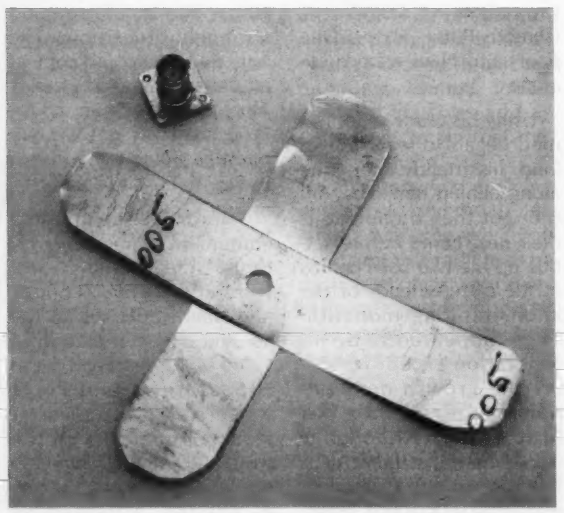

Photo B. Strips of shim stock before attachment of the BNC connector. Hat size will determine the length of the strips.

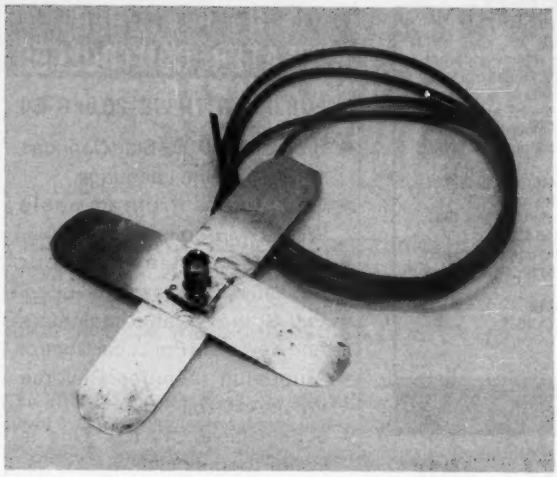

Photo C. Connector and strip assembly ready to be placed inside of the hat. Be sure the coax can reach at least to waist level.

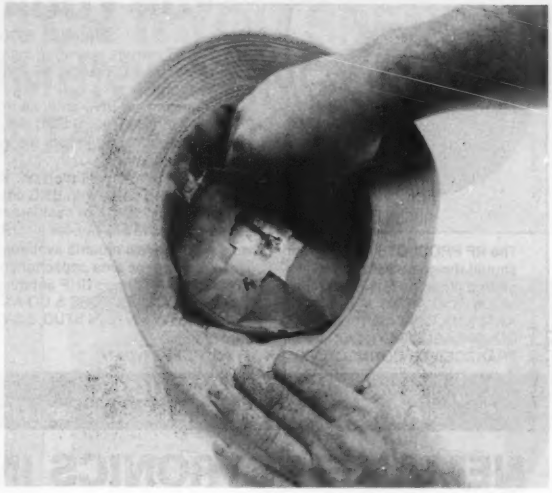

Photo D. Fitting the shim stock under the lining of the hat. A piece of fabric or cloth tape can be placed over the exposed area.

strips form an X provided access to the center conductor. The cable I used is RG-174. It's more flexible than heavier cable, and its small size makes it perfect for this application.

Some patience is needed when installing the ground plane/connector assembly inside the hat. By carefully cutting the lining with a razor, the shim stock can be inserted behind the lining of the hat. Determine where the BNC connector will come through the top of the hat, and cut a small, neat hole accordingly. The coax is also fed through the lining to the rear of the hat where it exits to drop down to your HT; it can be coiled up inside the hat when not in use.

Comparisons between the Hat-tenna and rubber duckies mounted on the HT show a noticeable improvement in performance. ■

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EXAMPLE: Suppose you made 10 phone calls — 9 completed, 1 busy — assume the completed calls average 20 talk exchanges each, 180 total.

You would spend 360 seconds (6 minutes!) *waiting for control* if you were using a sampling patch that samples every two seconds (180 waits × 2 seconds = 360 seconds). **It is a *severe inconvenience to have to press the button for a seeming eternity before you can be heard on each and every mobile reply.***

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SUMMARY

	CONTROL WAITS	TIME WAITED
Private Patch II	1	15 seconds
Sampling	180	6 minutes

If the sampling patch has a circuit that ***"slows the sample rate when telephone audio is present,"*** the speed of acquisition is made even slower. The wait time increases, and the phone party can say perhaps 25 or more words before they can be cut off.

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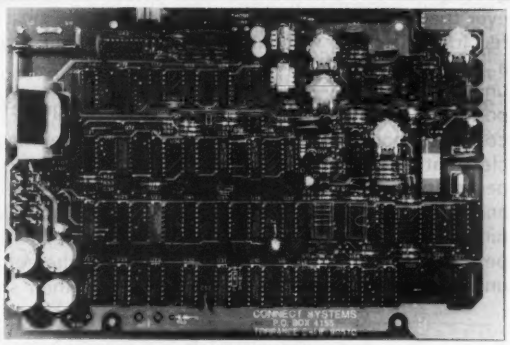

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Zounds! Grounds!

Here are the down-to-earth details you need to install a perfect ground system.

Every book on longwire or vertical antennas stresses the need for a good ground. If you have ever tried to make an end-fed longwire work without a good ground, then you understand why it is so important. We are also told in countless books and articles that a good ground is necessary to prevent TVI and protect against lightning. What is left unsaid, perhaps assumed to be universal common knowledge, is what constitutes a "good" ground. More pertinent to most amateurs, perhaps, is *how* do we obtain a good ground? For most amateurs, the answer is easy to achieve.

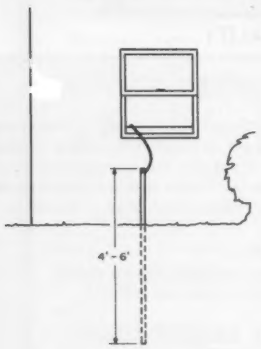

Fig. 1. An ungood ground.

What Is Not Adequate?

One way of defining an adequate ground is to describe situations that are not adequate. Some amateurs try to use the third-wire ground of the ac power line serving their shack as an rf ground. After all, it *is* grounded, isn't it? Well, that depends on what we mean by grounded. That third wire in the power system may be many wavelengths from the point where it is connected to earth ground. To dc and low-frequency ac (e.g., 60 Hz), such a wire is, indeed, low resistance. But to rf, such a long ground wire is a high impedance, so it may be no ground at all!

In addition to high impedance, there is also the possibility that wire and screw-terminal connections in the system are corroded. Unfortunately, corroded connections are often electrically nonlinear, and that can produce harmonics (TVI!). The power main, therefore, is not good for rf use.

Another form of ungood ground is shown in Fig. 1. I know an amateur who used a 4-foot ground rod driven only halfway into the soil outside his window. Thus, only 2 feet of rod were buried. There are at least two problems with this system. First, the ground rod was buried only halfway into the earth. Second, the darn ground rod was too short in the first place. The 4-foot size is always too short, and a 6-foot rod is considered marginal. The best is the 8-foot size, driven into the ground so that only 4 to 6 inches show, as seen in Fig. 2(a).

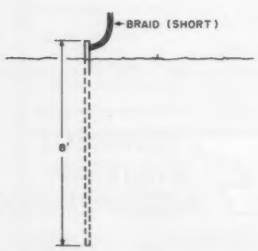

Fig. 2(a). The best ground.

Fig. 2(b). Three ground rods connected in parallel.

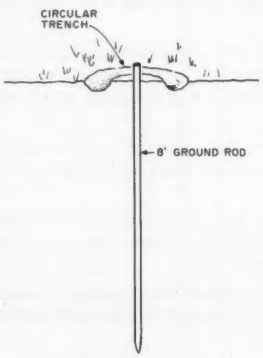

Fig. 3. A method for improving ground-rod effectiveness in very dry or sandy soil.

The wire lead between your equipment and the buried ground rod should be low inductance. For this reason, small-diameter wire is not suitable. Perhaps best is braid wire, or, if braid is too expensive, use the shield from a length of heavy coax (e.g., RG-8 or RG-11). In either event, the wire between the equipment and the ground should be as short as possible.

The electrical connection between the ground rod and the wire must be competent both electrically and mechanically. It should go without saying that a good electrical connection is first a good mechanical connection. For this reason, I prefer to both sweat-solder the braid and clamp it to the ground rod. The clamps that come on the ground rod are marginal, so I use the kind that electricians use. The big problem with the regular clamps is that they are fastened with only a slot-head screw, and they tend to work loose after a while.

The main idea in building a good ground system

is to reduce the impedance as much as possible. The resistive component of this impedance is mostly the resistance between the ground rod and the earth. Therefore, the biggest improvement comes from increasing the surface area of the ground rod that is in contact with the earth. This is the main reason why we want the ground rod to be driven in all the way and its length to be 8 feet.

A way to increase the surface area in contact with the earth is to use more than one ground rod. Fig. 2(b) shows three ground rods connected in parallel; I have seen as many as six in one system. A method shown in a book on lightning protection uses five arranged with four on the corners of a square and one in the center of the square.

The 8-foot ground-rod length assumes a reasonably moist soil (even though the surface may be dry). If the soil is very dry or if it is sandy, then some other tactic will be necessary. A method advocated for many decades in ARRL and other amateur publications is shown in Fig. 3. The idea is to dig a 6- to 8-inch-deep trench around the ground rod at a radius of 1 foot or so. The trench is filled with a chemical such as copper sulphate and re-covered. The chemical leaches into the soil and reduces its electrical resistance. The chemical must be renewed every several years.

Another high-surface-area, low-resistance ground is shown in Fig. 4. Here we see a 1-inch-diameter (or larger) copper plumbing pipe used as a ground rod. These pipes normally come in 8-foot and 10-foot lengths. Unfortunately, copper pipes do not survive the pounding required to drive them into the earth. Ordinary ground rods are not actually all

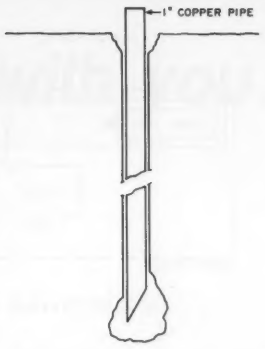

Fig. 4. Copper pipe used as a ground rod.

copper, but are steel with a copper coating on the outside to reduce the rf resistance. The well-known "skin effect" makes the rf current flow only in or near this low-resistance copper coating, and very little flows in the steel core. The steel core, then, can be used for strength.

The 1-inch (or larger) copper pipe will yield greater surface area in contact with the earth (and if we do it right, even the inside will be in contact with the earth) and so should yield a lower-resistance ground. The problem is, however, that the copper pipe is not strong enough to be driven into the ground.

Two people gave me ideas concerning this problem. One was a man at our church who said he used to use a garden hose and water pressure to drive the pipe into the earth, as shown in Fig. 5(a). The end of the pipe is beveled slightly, and then the water hose nozzle is inserted into the upper end. This connection must be held tightly by hand in order to build up water pressure in the pipe. By applying a downward mechanical pressure on the pipe while the water is applying its pressure to drive soil out from under the beveled point, the pipe will sink into the earth rather easily.

During the period when I

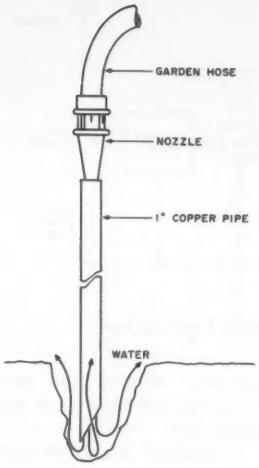

Fig. 5(a). One method of driving copper pipe into the earth.

was writing a monthly column for *Worldradio* newspaper, I discussed this method and used illustrations similar to Figs. 4 and 5(a). A reader wrote in and told me that he has been using that method for many decades of hamming and has improved on it a bit. He demonstrated by drawing the method shown

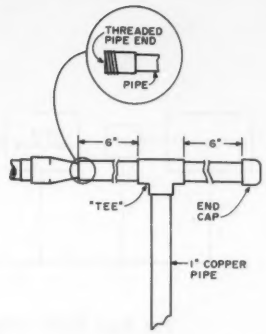

Fig. 5(b). Improved method for driving copper pipe into the earth.

in Fig. 5(b). Here we see a copper tee connector at the top end of the ground pipe. A short (6-inch or so) piece of matching copper pipe is extended out one end of the tee and capped to prevent the leakage of water (sweat-soldering is probably necessary). The

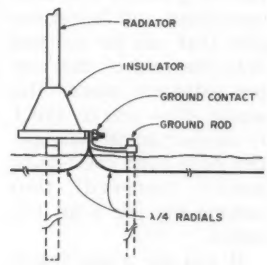

Fig. 6. Grounding a vertical.

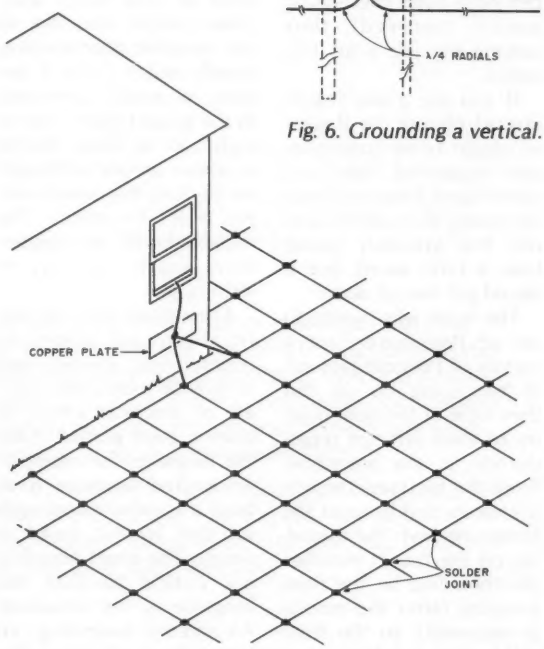

Fig. 7. Wire mesh ground system.

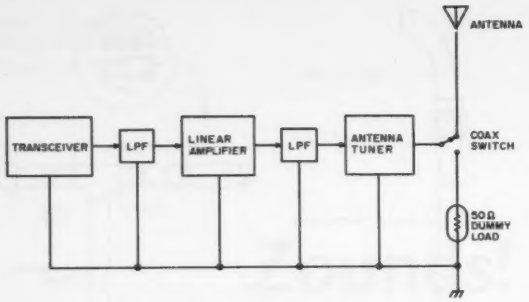

Fig. 8(a). Block diagram of my station.

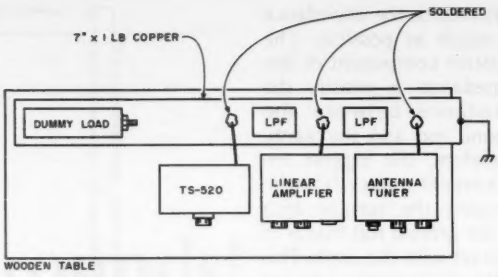

Fig. 8(b). Physical layout of my station.

other end of the tee also has a short piece of matching copper pipe, but this one is uncapped in order to accept the hose. The purpose of this method is to use the short pieces of pipe from the tee as handles to apply the downward force necessary to drive the copper pipe into the earth.

An alternative method shown by my correspondent is shown in Fig. 5(b) as an inset. It seems that plumbing supply and hardware stores sell faucet nipples that can be sweated onto the end of the copper extension piece. This would allow you to directly connect an ordinary garden hose (with the regular nozzle removed), thus making the job a lot less messy.

If you use a real faucet instead of just the threaded nipple as my correspondent suggested, then you would have a means of easily turning the water on and off. The assembly would look a little weird, but it would get the job done!

The ham who wrote to me at *Worldradio* sent a couple of Polaroid pictures of him using his rig, but they were of too poor quality to even attempt reproduction in the magazine. From the pictures, though, it appears that he used the faucet method. The threading on the faucet matches the threading on the hose coupling (after the nozzle is removed!), so the hose will be easy to attach. After the pipe is sunk into the ground, remove the tee coupling and save it for another day.

A vertical is another antenna that requires a good low-impedance ground. All too many people who attempt to ground-mount a vertical antenna will use the mounting pipe as a ground; that's a no-no. That pipe is usually only 2 or 3 feet long and is not a very good ground (galvanized steel).

Fig. 6 shows a method for grounding a vertical. Adjacent to the antenna is an 8-foot ground rod which is connected to the ground terminal of the vertical through a short piece of braid or very heavy wire. Some people also like to use resonant quarter-wavelength radials (2 to 4 per band, or more) connected to the ground point. The radials can be either buried or above ground (although on city lots the buried variety might be safer!). The radials should be quarter-wavelength (i.e., $L_{ft} = 492/F_{MHz}$).

The radials form an artificial ground plane, or counterpoise ground, and so may be used with a variety of antennas which require a good ground. Take the longwire, for example. An endfed longwire is at least a quarter wavelength on the lowest band it serves. The exact length is not critical because the longwire is not resonant. An antenna tuner (e.g., an L-section coupler) matches the high impedance of the antenna to the (usually) low impedance of the transmission line. Almost invariably, discussions of the longwire tell us that a good ground is needed (often without discussing what constitutes a good ground!). As one who had tried to operate longwires in the absence of a good ground, I can confirm that fine advice.

Unfortunately, the very factors which lead us to using a longwire also prevent us from obtaining a good ground for the longwire! A second-floor ham shack, for example, almost never allows a good ground because the ground line is too long. Another example is temporary and/or portable operation. In these cases, using two or more resonant quarter-wavelength radials will work wonders. When we first moved into our home, we had left all of our money with the real-estate-settlement attorney, and none was left for antennas. I was able to get on 15 meters by mounting a Hustler® mobile antenna and two radials in a second-floor window. Only occasionally, when the band was crowded, was I disappointed with the signal report.

Fig. 7 shows the ground system used by an old-timer I knew many years ago. Abe was originally licensed in the 20s when, he claimed, the ground would make or break an antenna system. When he bought his new house, Abe went out before the sod was laid down and constructed the wire mesh shown in Fig. 7. The wires were laid down about 2 feet apart, and each cross-joint was soldered with 2%-silver lead-tin solder. After the wire mesh was in place, the sod company buried it under a layer of sod grass.

My Ground

A couple years ago, the shack at K4IPV literally became a shack: an 8′ × 16′ Leonard shed in the backyard. After the shed was installed, I set about making my first ground-floor ham station. Figs. 8(a) and 8(b) show the equipment configuration.

My station has the usual lineup of equipment: transceiver, kilowatt linear, and antenna coupler. The coupler, by the way, is a coax-to-coax type and is used less for impedance matching than for additional attenuation of harmonics. The low-pass filter (LPF) between the transceiver and linear is used to reduce harmonics as much as possible before amplifying them in the linear. I have seen some amateurs use a low-power antenna coupler (e.g., a Drake MN-4) in this position.

The physical layout is shown in Fig. 8(b). The operating desk consists of a door made into a table. Along the back edge of the table is a copper strip. Sheet copper is specified by width and weight. The 1 pound/ft^2 weight is both acceptable and easy to work. Copper flashing used

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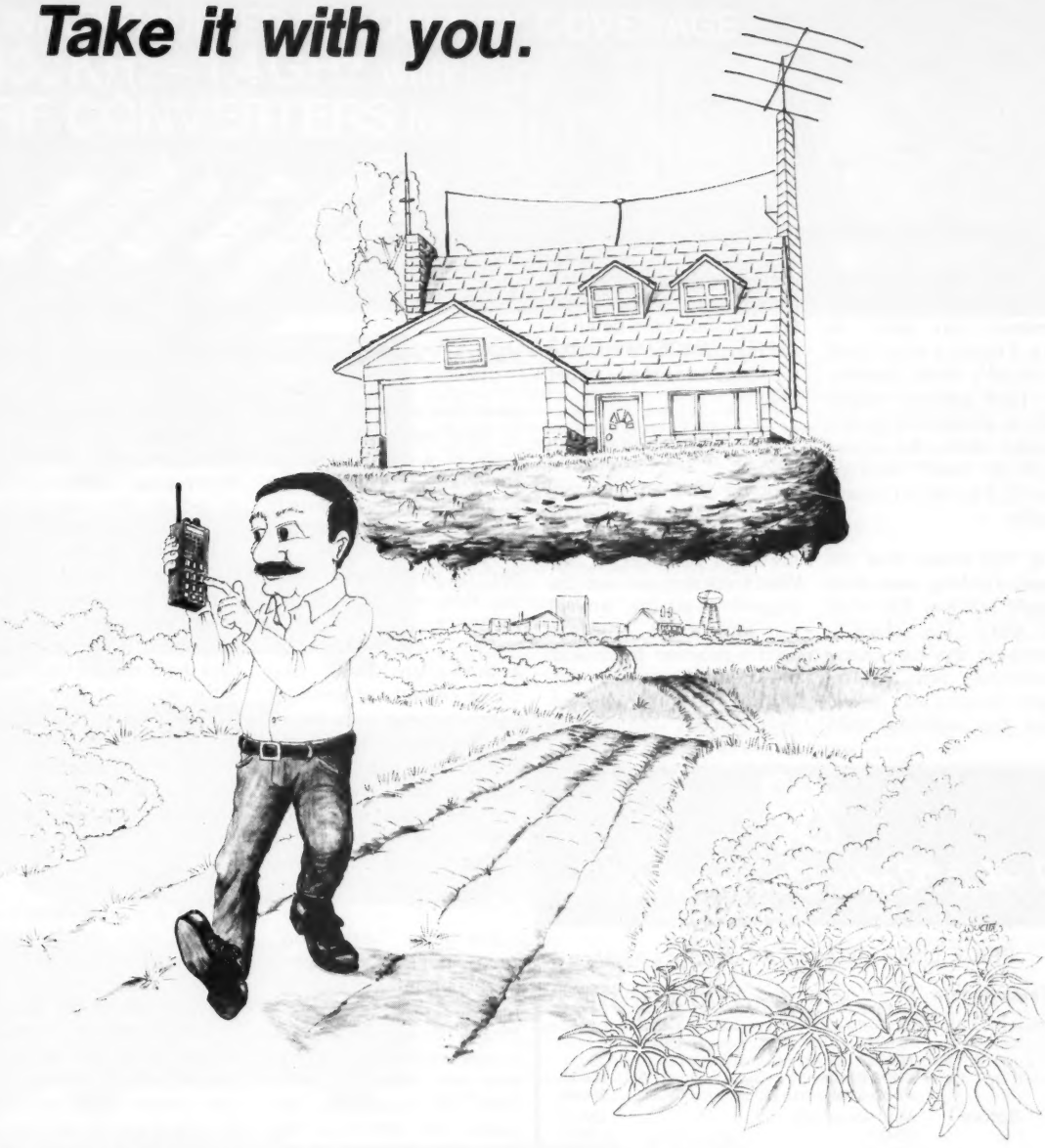

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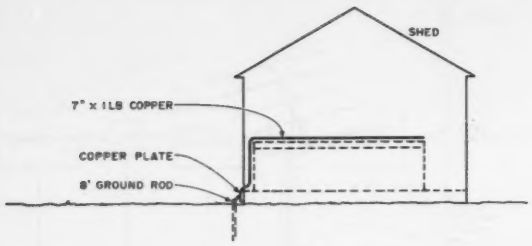

Fig. 9(a). Method of bringing the copper flashing outside.

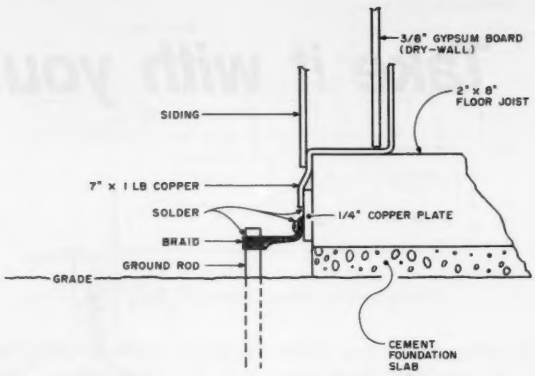

Fig. 9(b). Details of the flashing and copper plate junction.

to be available at all construction supply stores, but aluminum has taken its place. Copper is now found at specialty metal distributors. Each piece of equipment is connected to the copper sheet by short pieces of braid salvaged from RG-8 (or RG-11) coaxial cable.

Fig. 9(a) shows how the copper flashing was then brought outside. The shed uses metal skin, which is loosened by removing sheet-metal screws. The copper flashing was passed under the skin and then both bolted and soldered to a 1/4-inch copper plate. Fig. 9(b) shows the detail of the junction between the flashing and the copper plate.

Soldering to this system can be a bit torturous. I suppose that an old-fashioned 500-Watt soldering iron would do the trick. In my case, however, a 200-Watt soldering gun was the biggest available and it was insufficient. I instead used a propane torch with the Bernz-o-matic soldering tip. The solder was solid plumber's solder with paste flux. *Warning*: use *only* solid solder with resin paste or a heavy grade of resin-core solder. Some plumber's solder or paste is acid based, and that is a super no-no! Acid-core solder, or acid-based soldering flux, will *corrode the joints*.

The connection to ground consists of one 8-foot ground rod and four 6-foot ground rods driven (with two weekends of hard work) into hard Virginia red-clay soil. These rods are connected in parallel with each other at the 1/4-inch copper plate. Again, very short leads are used.

The term "very short" keeps popping up when discussing ground systems. Just what does "very short" mean? Is something which is very short at 80 meters also very short at 10 meters? Not necessarily, because very short is a relative term comparing a wire length to wavelength. In general, very short means "a small fraction of a wavelength." Typically, a length should be less than 1/8 wavelength. Obviously, a ground wire that is very short at 10 meters is also very short at 80 meters. Yet, a wire that is also very short at 80 meters may well be a good vertical antenna at 10 meters!

In addition to being short, an antenna ground wire should be low inductance. Thus, braid or strap should be used. Some people use multiple strands of heavy-gauge wire in order to reduce the inductance. These methods will also reduce the rf resistance of the ground wire. While dc currents flow through the entire diameter of a conductor, rf currents only flow near the surface; this is the so-called *skin effect*. By paralleling conductors or by otherwise increasing the cross-sectional area of the ground conductor, we reduce the conductor resistance.

Conclusion

That a good ground is a worthy goal needs little comment. In order to achieve that goal, we must be cognizant of the nature of the soil around us and of what constitutes a good ground. Obviously, a person operating from a desert community will have to follow a more rigorous path than a person living in a swamp. In either case, it is a matter of achieving a low-impedance path to ground. Some rules of thumb are:

1. Get as much surface of the conductor as possible underground.

2. Use short, low-inductance ground leads.

3. Use a counterpoise ground of quarter-wavelength radials if the two above are difficult to achieve.■

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●Bands: •MAIN (to cover 26~520MHz with SX-400) •800MHz~1.0GHz •1.0GHz~1.2GHz •1.2GHz~1.4GHz •AUTO (Automatic control of RF-8014 with an external computer, etc.) ●Frequencies shown in SX-400 display: 500MHz lower between 800MHz~1.0GHz, 700MHz lower between 1~1.2GHz, 900MHz lower between 1.2~1.4GHz. ●Individual Band Switches and LED Indicaters. ●Current Drain: 250mA (approx.) ●Accessories: 1 BNC/M-adapter, 1 Cable with BNC terminals ●Dimensions: W. 148×H. 51×D. 225(mm)

RF-5080 DOWN CONVERTER

500~800MHz RF converter for SX-400

●Bands: •MAIN (to cover 26-520MHz with SX-400) •500~600MHz •600~700MHz •700~800MHz •AUTO (Automatic control of RF-5080 with an external computer, etc.) ●Frequencies shown in SX-400 display: 300MHz lower between 500~600MHz, 400MHz lower between 600~700MHz, 500MHz lower between 700~800MHz. ●Individual Band Switches and LED Indicaters. ●Current Drain: 250mA (approx.) ●Accessories: 1 BNC/M-adapter, 1 Cable with BNC terminals, ●Dimensions: W. 148×H. 51×D. 225(mm)

RF-1030 UP CONVERTER

100KHz~30MHz RF converter for SX-400

●Bands: (1) 100KHz~1MHz, (2) 1~2MHz, (3) 2~4MHz, (4) 4~8MHz, (5) 8~17MHz, (6) 17~30MHz •AUTO (Automatic conrol of 6 bands of RF-1030 with an external computer, etc.) ●Frequencies shown in SX-400 display: 50MHz higher on all bands than the frequencies received. ●Individual Mode Switches and LED Indicaters: AM, USB, LSB, CW, AUTO •CW filter (optional) required for CW reception •AUTO—Automatic Control of modes of RF-1030 with an external computer, etc. ●Band Switch and LED Band Indicaters, Squelch Control, RF Att., AF Gain Control, Delta Tuning, IF ON/OFF Switch, NB (Noise Blanker) Switch. ●Current Drain: 1A (approx.) *Power Supply Unit P-1A (optional) required for RF-1030. ●Accessories: 1 BNC-M-adapter, 2 Cable with BNC terminals ●Dimensions: W. 300×H. 90×D. 233(mm)

ACB-300 ANTENNA CONTROL BOX

Manual and Automatic antenna control system for SX-400 series RF converters

●Individual Band Switches and LED Indicaters: 1030, 5080, 8014, 1.4GHz UP (for reception of 1.4GHz above) AUTO (Automatic control of antennas for RF-1030, RF-5080, RF-8014 and for MAIN scanner) ●Current Drain: 50mA (approx.) ●Accessories: 1 Cable with BNC terminals ●Dimensions: W. 148×H. 51×D. 225(mm)

SX-400

26~520MHz General Coverage Scanner

●Wider Coverage (100KHz~1.4GHz or above) with RF converters (optional). ●Computer controlled memory channel expansion (unlimited), High-Speed reprogramming, Record of Frequencies and Time, and all functions remote controllable with RC-4000 Interface (optional). ●20 memory channels, Momentary recall of any memory channel. ●Continuous normal and limit search without interruptions by birdies. ●Stop Mode Switch for scan or search of modulated signals. ●Quick search of the most important frequency with Priority. ●Selective FM Narrow/Wide Switch for FM/TV listening. ●Variable Delay Control (0~4 Sec.) ●Current Drain: 1A (approx.) ●Dimensions: W. 300×H. 90×D. 233(mm)

RC-4000 DATA INTERFACE **Control of SX-400 series Scanner and RF Converters through Computer.**

●Direct system for NEC 8801A computer. ●High-Speed Reprogramming of 20 channels. ●Scan of unlimited channels stored in computer. ●Record of Frequencies and Time of signals received. ●Automatic Control of Bands and Modes of RF converters and ACB-300.

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Photo A. Two-Tone Plus is an SSB-transceiver and linear-amplifier tuning aid which includes a sync output for stable rf-waveform viewing.

Your SSB transceivers and linear amplifiers are going to require periodic testing and adjustment if you intend to maintain clean station modulation. This is a fact of life since amplifier tubes change with time and even solid-state circuit adjustments drift a bit. One of the most helpful accessories for doing your modulation testing is the two-tone audio generator. When a two-tone audio signal is fed through an SSB transmitter, a distinctive rf pattern is formed which can be analyzed on a conventional HF (30-MHz) oscilloscope. The two-tone rf pattern can be used to diagnose most transmitter and linear-amplifier modulation problems. In this article I'll review two-tone test techniques and discuss the operation and construction of a two-tone audio generator which includes a sync output for stable rf-pattern displays.

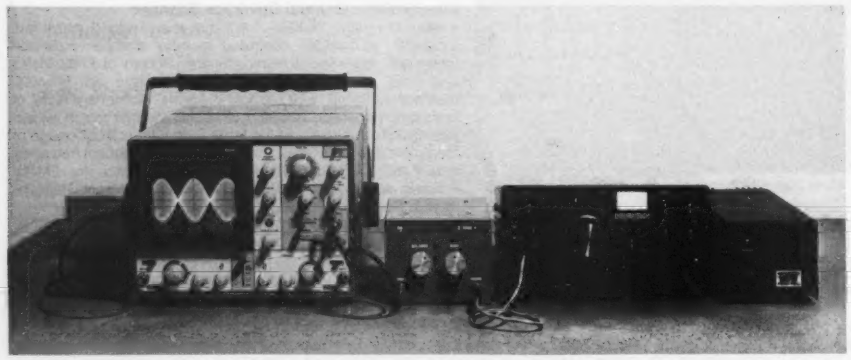


Photo B. Typical two-tone test setup. Refer to the text for high-power testing precautions.

Two-Tone Testing

Fig. 1 shows a typical two-tone test setup. The two-tone audio signal is fed into the microphone jack of the

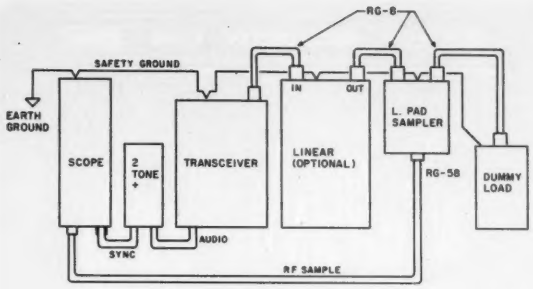


Fig.1. Two-tone test setup, top view.

SSB transceiver. The rf output of the transceiver is then routed through a linear amplifier (optional) and an L-pad sampler to a dummy load. A low-voltage sample of the two-tone rf signal is taken from the Sample output of the L-Pad to the vertical input of the oscilloscope for display. Take careful note of the safety ground interconnecting each component that operates from ac power and/or interconnects high-power rf. The safety ground should *always* be installed before any equipment is plugged into ac power and turned on.

Photo B shows a typical test setup. The L-pad sampler is on the far left and the two-tone generator is between the oscilloscope and the transceiver. Photo C shows a two-tone pattern indicating clean, linear modulation. Note that the envelope of the two-tone rf pattern appears to be made from two sine waves that are 180 degrees out of phase and connected at their zero-crossing points. Distortions in this classic pattern will indicate various modulation problems.

Fig. 2(a) again shows a normal two-tone rf envelope pattern. Fig. 2(b) shows distortion in the zero-crossing portion of the waveform. This is usually due to the bias current being set too low in the final stage of the transceiver or linear amplifier. (To determine which, test the transceiver by itself.) Fig. 2(c) shows clipping distortion due to overdriving the transceiver or linear. This type of distortion can generate serious "splatter" and should be avoided. The peak-to-peak amplitude where clipping (ALC disconnected) begins should be used as the maximum peak-to-peak amplitude for a voice waveform (to assure clean modulation). Clipping distortion can occur at less than rated power if the load for the transceiver or linear is incorrect, or if the output stage of the transceiver or linear is not properly tuned. Other causes of clipping below rated power include low screen voltage, weak finals, problems in the audio or low-power rf section of the transceiver, and power-supply problems.

Incidentally, certain solid-state transceivers do not work well with some of the older linear amplifiers, especially those linears with untuned inputs. In such instances, clipping distortion or low amplitude will often appear only on one side of the two-tone pattern, as shown in Fig. 2(d). Carrier leakage will cause alternate waveform peaks to be of different heights, as shown in Fig. 2(e), although this is not a sensitive test of carrier suppression. If the unwanted sideband is poorly suppressed, a ripple component will be seen on the two-tone pattern. Fig. 2(f) and Photo D show a two-tone rf pattern due to improper audio tone balance. The balance control on the two-tone audio generator should be carefully adjusted to produce a complete null in the corresponding rf pattern.

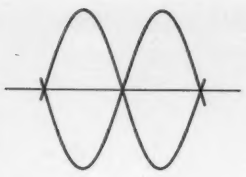


Fig. 2(a). Normal two-tone pattern.

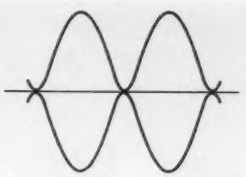


Fig. 2(b). Low amplifier bias pattern.

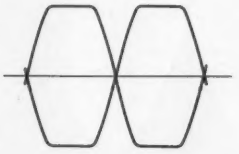


Fig. 2(c). Overdriven amplifier pattern.

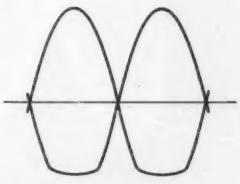


Fig. 2(d). Cycle loading distortion.

Two-Tone Plus

Let's now consider the design requirement of a two-tone audio generator. The generator should provide two low-distortion audio tones in the 300–2100-Hz frequency range, at least 1000 Hz apart. The tones should not be harmonically related, or one of the distortion frequencies (lower 3rd-order distortion product) will wind up on the carrier frequency and create a confusing display. Gain and Balance controls should be provided so the generator can be adjusted quickly for different transceivers.

There is one additional feature that would be

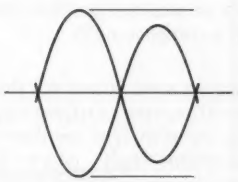


Fig. 2(e). Carrier leakage.

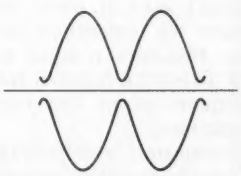


Fig. 2(f). Pattern due to unbalanced tones (not amplifier problem).

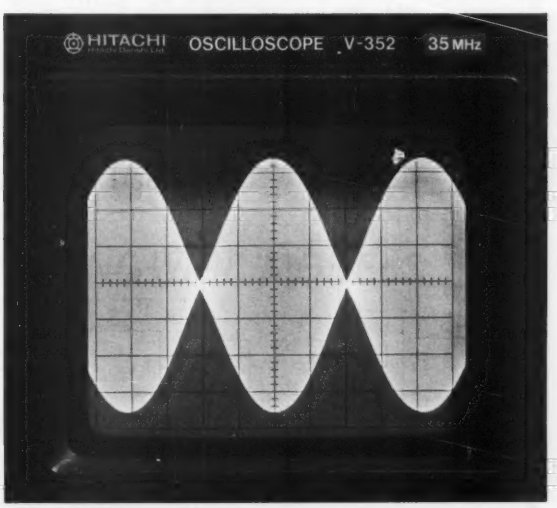


Photo C. Typical two-tone rf test pattern. Note stable display.

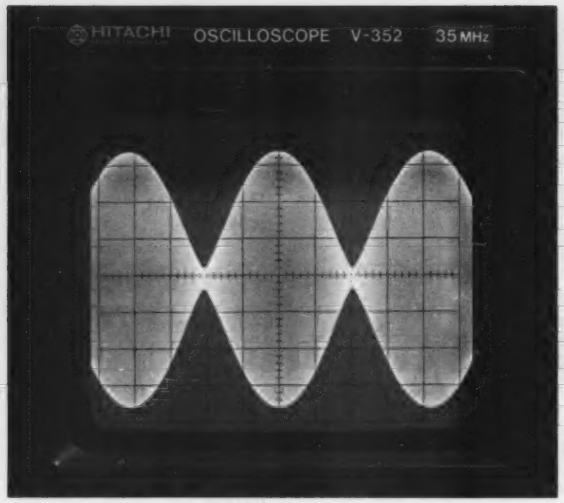


Photo D. Two-tone pattern with audio tones unbalanced. Not an amplifier problem! Always adjust the Balance control for a complete null.

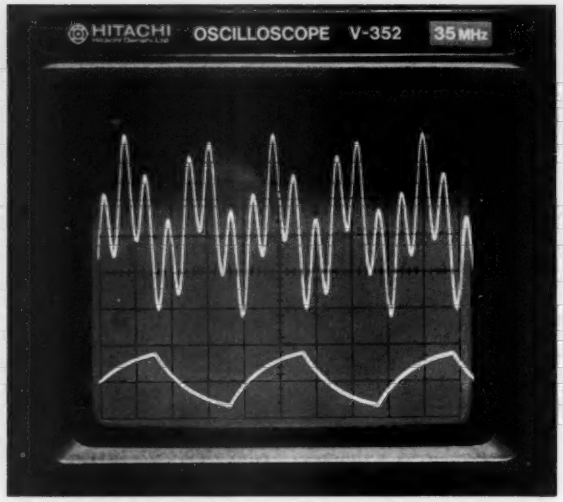


Photo E. Upper trace shows the composite audio output of the Two-Tone Plus generator. Tones are synchronized but are not harmonically related. Lower trace shows sync waveform. Both tones are harmonics of the sync frequency.

nice—a sync output for the oscilloscope. Otherwise, you have to sync on the rf waveform itself, which is quite touchy and tends to be unstable. Trying to sync on one of the audio tones doesn't work (I tried) because the rf-envelope-pattern frequency is equal to the difference between the frequencies of the two audio tones.

Fortunately, a simple PLL (phase-locked-loop) circuit can be devised to provide two tones that are not harmonically related but are both harmonics of the sync output. A few blackboards of higher math will quickly show that the difference in frequency between the tones will also be a harmonic of the sync, which means the scope will sync (?!) to the two-tone rf pattern.

So much for the theory, let's look at the block diagram in Fig. 3. The outputs of two sine-wave audio oscillators are summed in an adder circuit which includes the Balance control. The output of the adder circuit is routed through the Gain control to the audio output jack. The low-frequency oscillator, at about 480 Hz, is also converted to a square wave and divided by two to generate the 240-Hz sync output and reference frequency for the PLL.

Meanwhile, the high-frequency oscillator, at about 1680 Hz, is divided by seven and compared to the 240-Hz PLL reference frequency. The PLL outputs a control voltage to lock the 1680-Hz oscillator to exactly seven times the sync frequency. Note that the frequencies of the two output tones have a 3.5:1 ratio, so a direct harmonic relationship has been avoided. Also, the difference between the two frequencies is 1200 Hz, the 5th harmonic of the sync output. Photo E shows the two-tone audio output and the sync output of the generator.

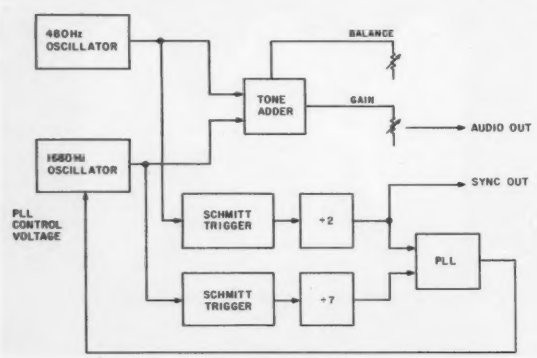
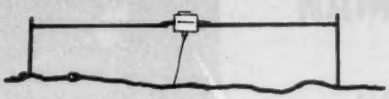
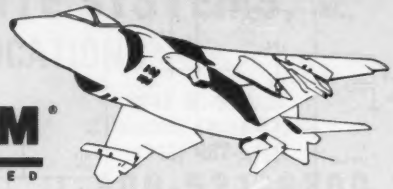


Fig. 3. Block diagram of Two-Tone Plus.

On to Fig. 4, the schematic of the generator's analog section. A TL084C quad op amp (IC1) provides all the analog active-device functions. IC1A and IC1B are used as conventional Wein-bridge oscillators with temperature-variable resistor feedback stabilization (R1 and R2). R3 and R7 provide oscillator amplitude adjustments, and R6 provides a fine frequency adjustment for the 480-Hz oscillator. Q1 acts as a voltage-variable resistor and is used to tune the frequency of the 1680-Hz oscillator by the PLL. IC1C adds the two oscillator tones together, with R15 acting as the Balance control. The output of the generator is taken from the Gain control, R25. IC1D is used to provide a ground reference equal to one half of the supply voltage. SW2 allows remote transmitter keying for most transceiver designs.

Fig. 6 is the schematic of the digital section of the generator. IC2 is a quad AND gate which is used for several functions. IC2A and IC2B are used as Schmitt triggers by applying positive feedback from their outputs through resistors R29 and R28, respectively. The 480-Hz signal is converted to a square wave by IC2B, and the 1680-Hz signal is converted to a square wave by IC2A. IC3 is a dual divide-by-sixteen counter. One section is used as a divide-by-two counter by simply taking an output from the first stage of division (pin 3). The second section is forced to divide-by-seven by detecting the count of seven with IC2C and IC2D and immediately resetting to zero. The divide-by-seven output is taken from pin 13. The divide-by-two output is applied to the reference input of the PLL (IC4) and to the network of R30 and C6, which creates the ramp waveform for the





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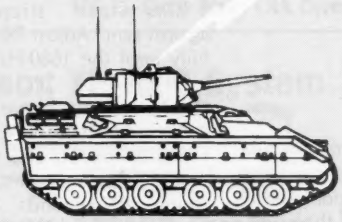

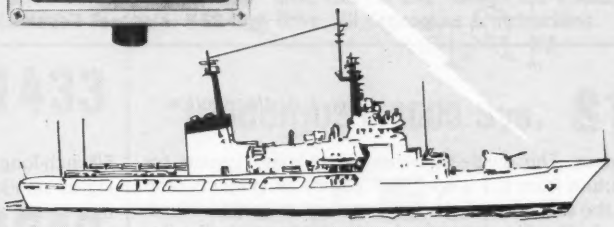

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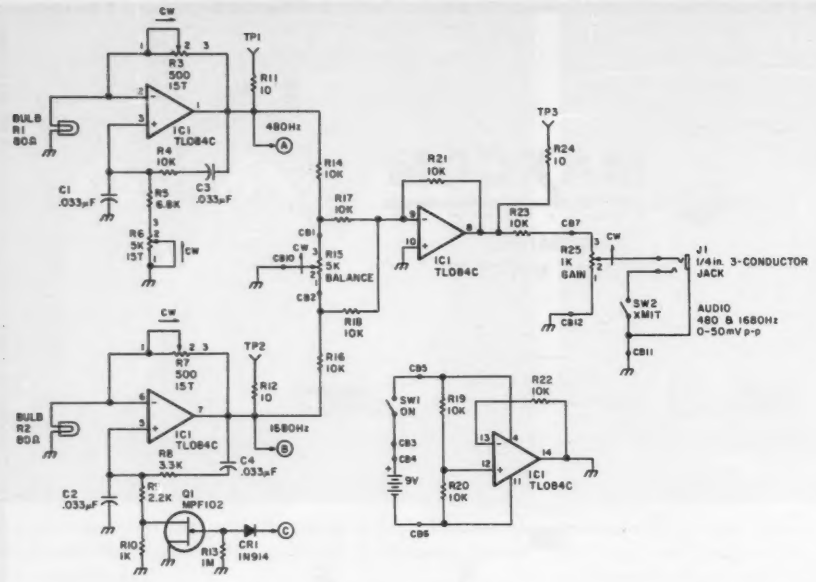


Fig. 4. Analog section.

sync output. The divide-by-seven output from IC3 is applied to the vco input of the PLL, pin 3. The PLL control voltage is output on IC4 pin 13. This voltage drives network R31-R32-C7, which basically sets the dynamics of the loop. R33 and C8 provide ripple filtering for the PLL control voltage, which is routed back to Q1. R34 and R35 provide a test voltage for tune-up purposes.

Construction

Photo A will give you my opinion of a functional front-panel layout and Photo F some ideas on interior arrangement. After receiving many letters asking for circuit-board layouts for my earlier *73* projects (and some coaxing from ye friendly editor), I bit the bullet this time and have done circuit-board artwork. I must admit it speeds up construction. Fig. 6 gives you the circuit-board artwork 1:1. Fig. 7 details parts placement. I used a #70 bit to drill out the IC pads and a #65 bit to drill out the rest. The four mounting holes were drilled out with a 1/8-inch bit.

You should be able to build the project on a perf-board, or wire-wrap (that's a digital term) it if you choose. The circuit board in my two-tone generator is held in place with 4-40 screws, using 5/8-inch-long aluminum tubing as standoff spacers. The tubing has an inside diameter a little larger than 1/8". Notice that I recommend high-quality 2-Watt potentiometers for the Balance and Gain controls. These pots don't creep or get noisy; they are well worth the extra money.

Tune-Up

After construction is complete and you have carefully checked for solder bridges and correct wiring, turn the on/off switch to off and install a *fresh* 9-V battery. Jumper TP4 and TP5 together. Set R3, R6, and R7 mid-range (remember these are 15-turn pots). Center the Balance control and crank the Gain control all the way up. Turn the on/off switch to "On" and hook your scope to TP1. Adjust R3 for a 3-V p-p sine wave. At this amplitude there should be no apparent distortion in the sine wave, unless the battery is flat. Adjust R6 for a sine-wave period of just less than 2.1 milliseconds (480 Hz). Amplitude and frequency interact a bit so you may need to adjust R3 and R6 in sequence a couple of times.

Now look at TP2 and adjust R7 for a 3-V p-p output. Using TP1 for sync, again look at TP2. You should see a sine wave "slipping" against sync. Adjust R6 carefully until the 1680-Hz sine wave seen on TP2 nearly stops. Now remove the jumper between TP4 and TP5. The 1680-Hz sine wave should lock in sync within a couple of seconds. Now touch up R3 and R6 slightly, if necessary, for 3-V p-p sine-wave amplitudes at TP1 and TP2, respectively. Both sine waves should be free of distortion. Check the waveform at TP4. It should be between −0.5 and −1.0 V dc, with little apparent ripple. Short TP4 and TP5 together a couple of times while monitoring TP3 to ensure that the PLL readily locks. Check the Audio output jack and the Sync output jack for proper waveforms, as seen in Photo E. Turn the two-tone generator on and off several times to ensure that it stabilizes and locks up reliably. Make any adjustments needed. If you have any problems, review the schematics and the theory of operation for hints.

You will need to make up an audio cable between your two-tone generator and your transceiver. Of course, there is little standardization between microphone connectors. Refer to your transceiver manual for information.

L-Pad Power Sampler

Fig. 8 is the schematic of

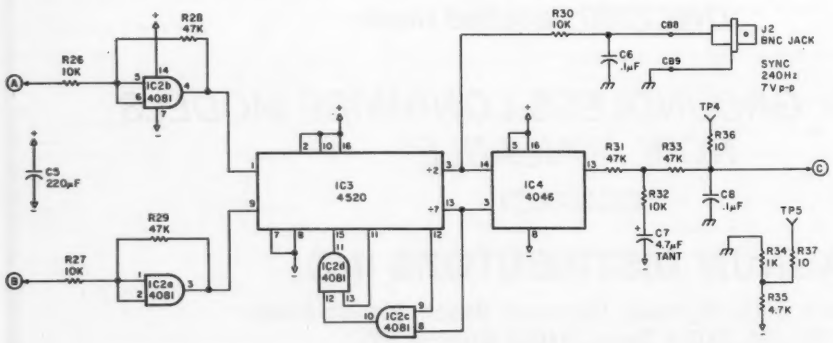
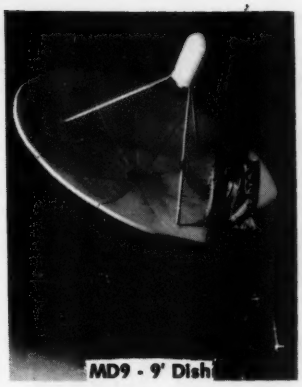


Fig. 5. Digital section.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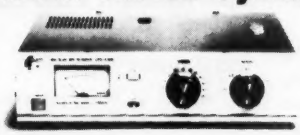

Drake ESR 240 System $1542
Drake ESR 324 System $1392
Luxor Mark II System $1908
Maspro SRS System $1692
Dexcel 1300-01 System $1543
Dexcel 1200-01 System $1293
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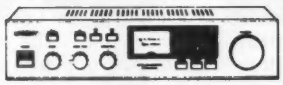
Uniden UST 3000 Sys. $1472



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NSS Memory Tracker	$100
MTI 2100	$225
MTI 4100	$345
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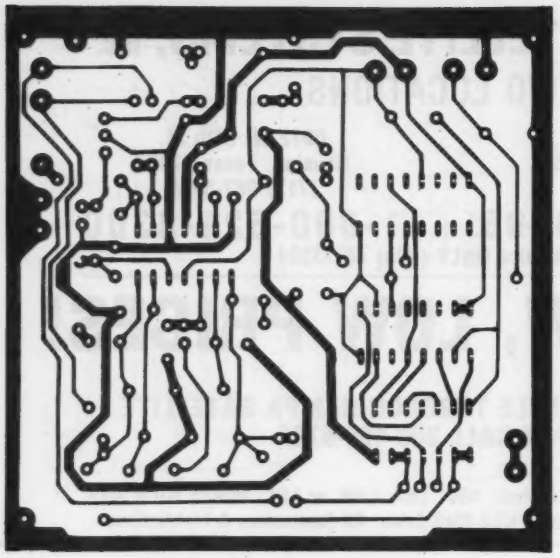

Fig. 6. PCB artwork.

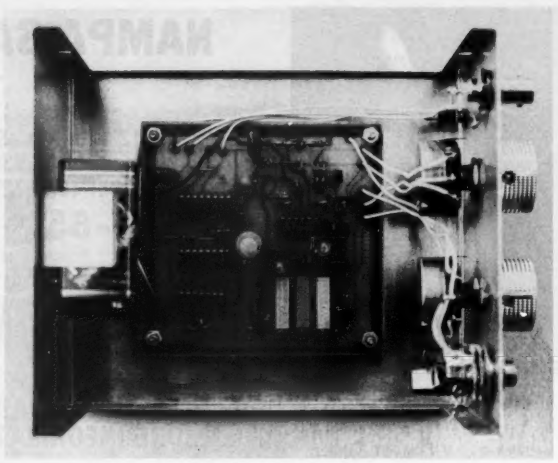

Photo F. Interior layout of the two-tone generator. Construction is quick and simple.

the L-pad sampler and Photo G provides a view of the internal construction. Four pairs of 4.7k, 1-Watt resistors form the series element of the sampler, and a 51-Ohm, 1/2-Watt resistor forms the shunt element. A single hair-thin strand of copper wire from an old "zip cord" provides some fusing protection in the event of a component failure or circuit fault.

Because of the power involved, build the L-pad sampler carefully. The circuit board used to mount the resistors has a very simple pattern (see Photo G) which can be easily etched using masking tape for resist. Note that the resistor sets are spaced 3/8 of an inch apart. Looking at the upper left corner of the circuit board, note that the clearance between the mounting nut and the circuit-board pattern is 1/4" minimum. Note that in the lower right corner of the circuit board, the mounting nut provides a ground point. A ground wire is also taken from this point to the BNC-connector ground lug, which is fashioned from copper shim stock.

The circuit board in the sampler is mounted using 4-40 screws, with 1/2-inch-long pieces of aluminum tubing used as standoffs. The "fuse" wire must be at least 1/2" long. Route it away from the mounting nut in the upper left corner of the circuit board, and from the wall of the minibox. The heavy wire connecting the SO-239 connectors came from the center conductor of a piece of RG-8 coax. The L-pad minibox is a Bud CU-3008-A.

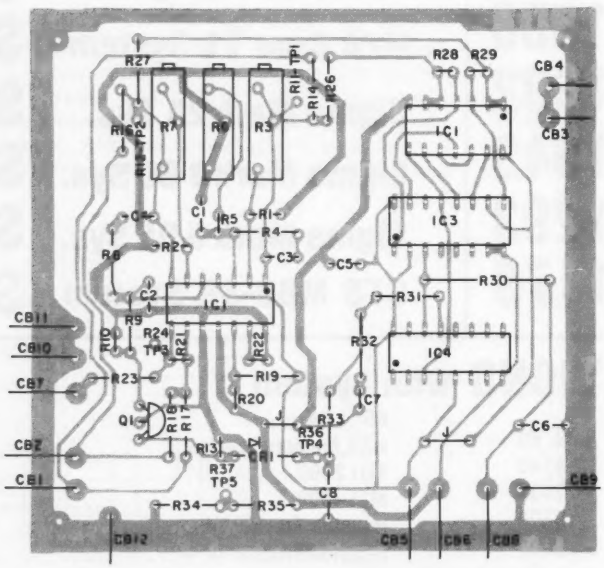

Fig. 7. PCB parts placement.

Initial Testing

Prepare to hook up your L-pad to your transmitting equipment. Be sure everything is properly grounded. I suggest mounting the L-pad on an aluminum plate, which is in turn wall-mounted. Ground the plate! Do not connect the L-pad to the scope yet. Connect your transceiver to an swr meter, the swr meter to the L-pad, and the L-pad to a dummy load. Starting with low power (100 Watts or less), key down for 30 seconds. The L-pad should introduce no swr. After key-down, *turn off* all transmitting equipment and quickly inspect the interior of your L-pad. The fuse should be OK and nothing should be hot. Continue testing to full station power. If everything has gone well, *power down* all transmitting equipment and connect in the oscilloscope and two-tone audio generator. Be sure all safety ground wiring is hooked up (refer to Fig. 1). Set your scope to one volt/

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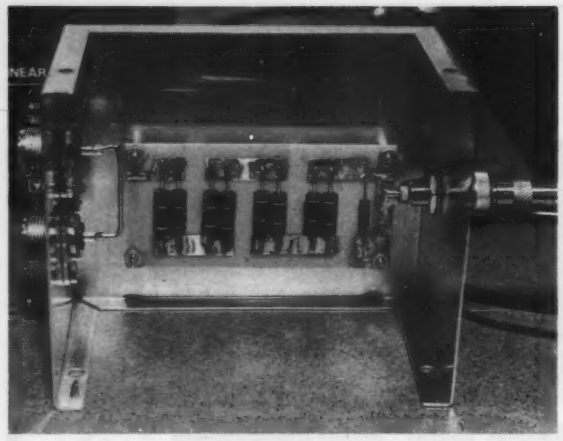

Photo C. Construction detail of the L-pad sampler. Although simple, build the L-pad carefully since it handles high power.

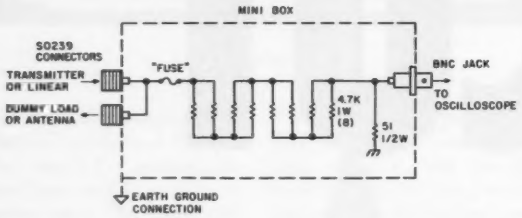

Fig. 8. L-pad power sampler. All resistors comp. or film (non-inductive). Fuse is thin copper strand from zip cord, 1/2" to 3/4" long. Connect SO-239 connectors with RG-8 center conductor wire. Keep BNC connector 3" away from SO-239s; space resistor sets 3/8" apart. Test run sampler at full power before connecting to scope. Maximum power 2 kW PEP; 1 kW CW. Maximum vswr 2:1.

division. Turn the two-tone generator on and allow it to stabilize. Be sure the Balance control is centered and the Gain control is turned down. Key the transmitter from the Xmit switch on the two-tone generator and adjust the Gain control and scope settings for a display similar to Photo C. How does the modulation look? Continue testing to full station power. Remember, don't go over 2 kW PEP. When using the L-pad sampler, don't exceed an swr of 2:1.

Parts List

Circuit Board			
TL084C	Quad op-amp IC	IC1	1,2
4081BE	Quad AND gate CMOS IC	IC2	1,2
4520BE	Dual ÷ 16 CMOS IC	IC3	2
4046BE	PLL CMOS IC	IC4	2
MPF102	JFET	Q1	2
1N914	Diode	CR1	1,2
RS 272-1141	12-V-dc, 25-mA lamp	R1-R2	1
43P500	15-turn, 500-Ohm pot, ¾ W	R3, R7	2
43P5000	15-turn, 5000-Ohm pot, ¾ W	R6	2
MY .033/100	.033-uF mylar™ cap, 100 V dc	C1-C4	2
MY .1/100	.1-uF mylar cap, 100 V dc	C6, C8	2
R 220/16	220-uF, 16-V-dc radial elect.	C5	2
TM 4.7/35	4.7-uF tantalum cap, 35 V dc	C7	2
Other resistors are ±5%, ¼-W, metal film.			
Chassis			
CU3007A	Bud 6" × 5" × 4" minibox		local
CMU5021	5k-Ohm, 2-W pot	R15	2
CMU1021	1k-Ohm, 2-W pot	R25	2
RS 274-323	¼", 3-conductor jack and plug	J1	1
RS 278-105	BNC connector	J2	1,2
RS 275-324	SPST miniature toggle switch	SW1-2	1,2
Plus hardware, 22 AWG wire, battery, clip, etc.			

Suppliers

1. Radio Shack
2. Jameco Electronics, 1355 Shoreway Road, Belmont CA 94002, (415)-592-8097.

Note: Equivalent components are available from many other suppliers.

Closing Thoughts

Some of the newer transceivers feature tuning controls on the microphone and are probably going to be difficult to interface directly through the microphone connector. For these rigs, try running the two-tone audio signal through an amplifier and low-distortion speaker. Just hold the mike in front of the speaker and key up. Not ideal, but better than nothing. Many transceivers and linears heat up quickly when running two-tone tests. Don't test too long each time, and allow generous cool-down periods. Be careful. You can be very seriously burned on high-voltage rf, and high-voltage dc shocks can be lethal. Use the utmost care when testing and maintaining your station equipment.

If you would like to ask me a question about this article, please send an SASE. 73!■

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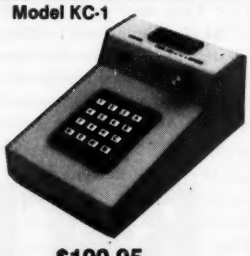
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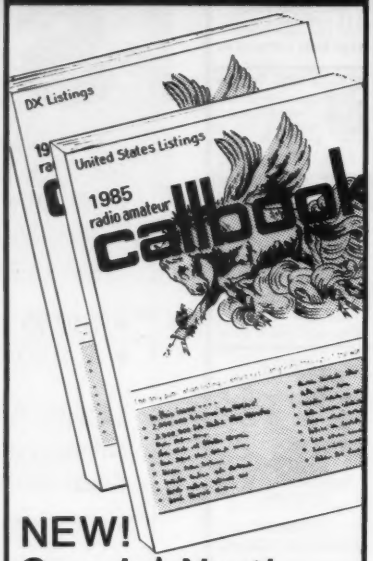

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One of the most fascinating aspects of radioteletype is monitoring the thousands of commercial, military, and governmental broadcasts which go on daily outside the ham bands.

Not only can anyone copy such services as AP (Associated Press) and UPI (United Press International), which are the two we are most familiar with in this country, but also TASS (Telegrafnoye Agentstvo Sovetskogo Soyuza) from the Soviet Union, AFP (Agence France Presse) from France, Reuters from England, and dozens of others.

Maybe you would like 24-hour weather from just about anywhere in the world, or to feel like a spy and print out embassy communications. (The stuff is in code and impossible to read but it still gives a feeling of excitement.) Maybe you would like to practice reading Spanish, French, or some other language. It is all there between the ham bands and easy to copy—if you know how and where.

Since this was written, the TASS and Prensa Latina services from CLN-451 on 14,901 kHz have been transferred to CLN-452 on 14,928. Also, the American Republics Wireless File afternoon transmissions have been discontinued, and that material has been added to the morning schedule. This was done to counter poor propagation to those posts not linked by computer net.

Equipment

To receive commercial RTTY such as this requires the usual amateur RTTY equipment and maybe a few additions. First, of course, you need a good general-coverage receiver. Those who have one of the new transceivers with built-in general coverage are all set. The rest of us will have to make do with something else. In general, if the receiver is stable and selective enough to do a good job on SSB signals, it will perform nicely for commercial RTTY.

I use an old Collins R388 (with added mechanical filters) or a pair of Hammarlund SP600/JX17 war-horses, and they do nicely. The Collins is the better due to the much more accurate frequency readout, something that is important when trying to locate or identify particular stations. For a long time I used a BC348 military receiver. Using a big expensive receiver is not really required for starting out.

While it would be nice to use special antennas, they are not necessary. The regular ham antennas will do very well.

For the terminal unit, the regular amateur type will work very satisfactorily provided it can handle shifts greater than 170 Hz. Many amateur TUs are built only for 170 Hz and will be of little use. Most commercial RTTY transmissions are 425- or 850-Hz shift, although a small number can be found ranging from about 50 to over 1000 Hz.

Selectable sense is a must. For the most part, the commercial stations are not plagued with the interference found in the amateur bands. For this reason, even a simple phase-locked-loop demodulator without filters will do a surprising job.

If you use a computer to decode the signals, several things should be kept in mind. First, the software should be able to handle all speeds from 45 to 74.2 baud Murray. (While Murray and Baudot are not the same, nearly everyone treats them the same.) While some ASCII, SITOR, and other modes are in use, most of the action is still with the 5-level Murray code at speeds of either 50 or 74.2 baud. It seems amateurs are about the only ones using 45 baud. In three years of daily monitoring, I have never copied a transmission using 56.9 baud (75 wpm). That does not mean 75 wpm is unused, but that would appear to be the case.

Second, with some sys-

tems the length of the stop bit can cause problems. This is particularly true in computer systems that use the cassette port as a TU and where the stop-bit length is determined by a machine-language timing loop. In these systems, serial-to-parallel conversion is done by machine language rather than UART. I faced this problem with software I had written for the Timex/Sinclair TS1000. The stop-bit timing loop would still be running while the next character was being transmitted. The result was garbage. Dedicated systems do not have this problem. Also, if the software is written for a stop-bit length of 1 or 1.5 data bits, there should be no problems.

Those who use UART serial-to-parallel-to-serial upspeed converters to drive a standard teleprinter should also be aware of the stop-bit-length problem. The UART should be set for the shortest stop bit possible, usually 1.5. The speed converter will be compatible with any signal using a longer stop bit. The reverse, however, is not true. Normal 5-level code calls for a stop-bit length of 1.5, but many military and weather transmissions use a stop bit equal to 2 data bits. Obviously, timing errors will occur on full-speed transmissions using a stop bit shorter than that of your speed converter.

Actually, there are a number of "standard" stop-bit lengths. The 60-wpm system used by amateurs is actually 61.3 wpm with a stop-bit length of 1.42. Other stop-bit lengths include 1, 1.27, 1.5, 1.97, and 2. The standard international system of 50 baud (66.6 wpm—usually called 66 or 67 wpm) uses a stop bit of 1.5. However, many of the 50-baud transmissions encountered on the air use a stop bit of 2, which is 62.5 wpm.

In truth, the wpm figure is somewhat meaningless. The longer stop bit allows the receiving equipment to maintain synchronization better if the start pulse is clobbered by interference. This is why most cryptographic transmissions use the longer stop bit. One missed character could require the entire transmission to be repeated.

If all this sounds confusing, do not worry too much about it. But if you have errors in your copy that you cannot explain, then you might take a closer look at the stop-bit lengths involved.

Another thing to consider is the various keyboard layouts in use by the different services. Weather services have, in the past, had their own special keyboard with symbols to represent different weather conditions. This system may still be in use, although I have found no indication of it. Most foreign press services use the CITT No. 2 system. If received on an American Communications system (the kind in use by most amateurs), problems can occur. For instance, with the CITT system, a shifted S is the apostrophe rather than the bell, as on the American Communications system. This means that every time they send an apostrophe your bell will ring; do not assume something is wrong with your receiving equipment.

Those with a standard American Communications keyboard (or software) and an active bell in their system will soon find it desirable to disconnect it, especially when receiving some French transmissions. French transmissions are not the only problem, however, as many press services use a double apostrophe in place of quotes. This is because the CITT system has no quote key; it has a plus sign in its place.

While I am set up to use the computer as a RTTY monitor, in practice I prefer the old teleprinter machine to do most of the work. While it is noisy, I am not locked into a given amount of memory. Thus, I can set up on a service, print eight hours worth, and read it at my leisure. TTY paper is far cheaper than paper for the line printer. Also, it does not tie up the computer for long periods of time when I could be using it for something else. It is the best of both the old and the new.

ADN—Allgemeiner Deutscher Nachrichtendienst (East Germany)
ANA—Aden News Agency (Yemen)
ANGOP—Agencia Angola Press
ANSA—Agenzia Nazionale Stampa Assoc. (Italy)
APN—Agentstwo Petschato Novosti (USSR)
CNA—Central News Agency (Republic of China)
DIPLO PARIS—French Ministry of Foreign Affairs
DPA—Deutsche Press Agentur (West Germany)
DYN—Diarios y Noticias (Argentina)
KCNA—Korean Central News Agency (North Korea)
KUNA—Kuwait News Agency
MAP—Mutual Arab Prass (Morocco)
NA—Noticias Argentinas
PAP—Polska Agencja Prasowa (Poland)
SAPORITI—Agencia Noticiosa Saporiti (Argentina)
SUNA—Sudan National News Agency
TANJUG—Telegrafska Agencija Nova Jugoslavija (Yugoslavia)
TELAM—Agencia de Noticias Telam (Argentina)
VNA—Vietnam News Agency
XINHUA—New China News Agency (People's Republic of China)
YONHAP—Yonhap News Agency (South Korea)

Fig. 1. Foreign press services.

Tuning

Tuning commercial RTTY transmissions is much the same as tuning amateur signals, with one possible exception. If you have depended on your ears as a tuning guide for amateur signals, you will find that things sound different. This is because the commercials use a wider shift. It should not take long to get to the point where you will be able to recognize the shift just by hearing the signal. An oscilloscope is still the best tuning aid.

If after tuning in the signal properly and identifying the shift being used the resulting readout is garbage, then several things could be wrong. The first is that your equipment may be set for the wrong speed. Change speeds and try again. (After some practice you should be able to identify the speed just by ear.) If changing speeds does not clear up the copy, try changing the sense. Some combination of speed and sense will usually yield good copy—if the transmission is printable.

Finding a Signal

Now that everything is ready to go, where do you look for a signal? Probably the easiest to receive are the WBC weather transmissions from Miami, Florida. These are on 24 hours a day on over a dozen frequencies. Try 8105, 8130, and 8140 kHz. These are usually best in the evening and at night. The 8140-kHz frequency is taken over around 0700 UTC by Castro's propaganda arm, Prensa Latina (PL), so be forewarned.

The weather reports are sent at 74.2 baud (100 wpm) with a shift of 850 Hz. Most are in weather code, which is not readable without a key (available at most large libraries), but you will be able to tell how well your system is working by using these stations. Like most

commercial and press stations, they do not transmit data continuously, so for 10 or 15 minutes at a time you may hear only a mark carrier. Since these three stations do not transmit the same data at the same time, if one is idle, try another.

For news with a different slant, try the PL transmission at 0700 UTC on 8140 kHz. It is in English with a speed of 50 baud and 425-Hz shift. Other active PL frequencies are 14,901 and 16,348 kHz. Daily sign-on for these latter frequencies is around 1730 UTC (it changes from day to day) with "news" in English for Central America. Cuban transmissions are not known for their stability and may disappear in mid-sentence. The English is rotten and misspelled words abound—don't blame your equipment.

The Cubans also relay a TASS English transmission on 14,901 kHz. This starts around 1200 UTC and continues until the sign-off—usually between 1600 and 1700 UTC. TASS has far more polish than PL and the English is much better. While all of these transmissions are normally 50 baud with 425-Hz shift, don't be surprised if one shows up at 170-Hz shift or if the sense changes from day to day. Even the speed has been known to change. (As I write this they are using 45 baud!) The signal also may drift or even suddenly shift frequency by several hundred Hertz and just as suddenly shift back minutes later.

The Cubans (or at least my limited Spanish leads me to that conclusion) also operate several other services, Prensa Minrex and what is labeled Embacuba. These seem to have no set schedule or frequency. Sometimes they appear to be the same. Usually the transmissions contain Spanish text and/or messages made up of 5-number code groups. Another that seems to be Cuban uses the military-type callsign DIME. Transmissions are in Spanish and have been copied changing speed in mid-sentence.

WBC—National Weather Service (USA)
JMI—Japan
333—USSR (from RVW 53)
AMMC—Australia

Fig. 2. Examples of weather service identifier codes.

For serious copying of weather transmissions, the unshift on space (USOS) function should be turned off. Since both weather and the coded traffic of embassies (and the like) are nearly all in number groups, it is far easier to read if it is printed properly. Most of the transmissions appear to be sent with the assumption that the receiver does not have USOS. For the press services, however, using the USOS corrects more errors than it causes.

The USOS should also be used when copying traffic transmitted in the Cyrillic alphabet used by the USSR and other countries. Without USOS, most Cyrillic transmissions look like so much garbage. With USOS, however, it is possible to read a word now and then and maybe even get an idea of what the traffic is about. Cyrillic transmissions come in two types: 2 level and 3 level. The 2 level is just like the regular keyboard with upper and lower case, although the characters are much different. The 3 level, which appears to be the most common, has a second additional shift allowing access to another group of characters. The regular Murray machine prints these extra characters as numbers or punctuation.

To receive some of these Russian stations, try 16,700 kHz plus or minus 10. If propagation is good, several can usually be heard. Nearly all use 170-Hz shift. I have noticed several strong Russian stations around 12,500 kHz, also. Recently copied callsigns include UWFW and UEFZ. Much of the traffic will have easily-readable tags such as Radio Murmansk and Odessa Radio.

If you would like to practice your Spanish, there are a number of easily-copyable signals available. The easiest to receive (at least at this location) are the AFP Paris transmissions relayed via New York or, depending on the frequency, Martinique. These run sporadically throughout the day. Try 15,908 kHz for the New York relay (via WEY 35) and 16,183 kHz for the Martinique relay (via FZF 62). The Martinique transmission is supposed to be in Portuguese for Brazil, but it looks like Spanish to me. Also, the Martinique signal may be difficult to tune, as a direct Spanish transmission from Paris can be heard on 16,184 kHz. All of these use 50 baud with 425-Hz shift. AFP has also been copied in French on 18,669 and 15,978 kHz, and in English on 15,977 kHz, among others.

Reuters, the British news service, can often be copied on both 18,334 and 18,336 kHz, although the conditions are not very good at this location. Those on the east coast can probably receive them better. I have received them as early as 1500 UTC. They use 325-Hz shift. Another frequency to try is 10,959 kHz around 0400 UTC.

UPI in English from Hong Kong can be copied on 19,520 kHz when propagation is favorable. I have had the best luck during the late evening and early morning hours. AP and UPI transmissions are hard to find, as most have been shifted to satellites.

The United States Government also has a RTTY press service. Depending upon which one you receive, it can be called the VOA (Voice of America), USIS (United States Information Service, aka United States Information Agency), the African File, the Asian File, and for South America, ARF (American Republics Wireless File. In any case, all come from the USIA in Washington.

These transmissions, unlike most foreign government press services, do not seem to be aimed toward the general public but to USIA posts in the target area. Much of the material is "for mission staff only and not for publication." The rest of the material is in English and is then repeated in the languages of the target area. Several times a month they list job openings within the agency along with media reports and other "inside" information. Also, unlike most press services, these use 74.2 baud. Because of this speed, you can expect a higher error rate in your copy. The shift is usually 425 Hz, but this seems to be slightly variable. Some of the transmissions appear to be about 80-Hz shift and multiplexed and transmitted on independent sideband with VOA SSB feeder transmissions.

ARF begins "sked 2" at about 1715 UTC on 14,638 and 18,542 kHz, among others. (I have never found "sked 1"—if there is one—and recently I noticed they dropped the "sked 2" introduction label.) These are 74.2 baud at 425-Hz shift. The transmissions open with about 15 minutes of RY tester and callsigns. "Sked 3" begins at 2015 UTC using the same format and frequencies.

Overseas VOA transmissions can be copied on a number of frequencies,

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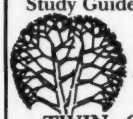

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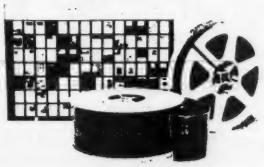

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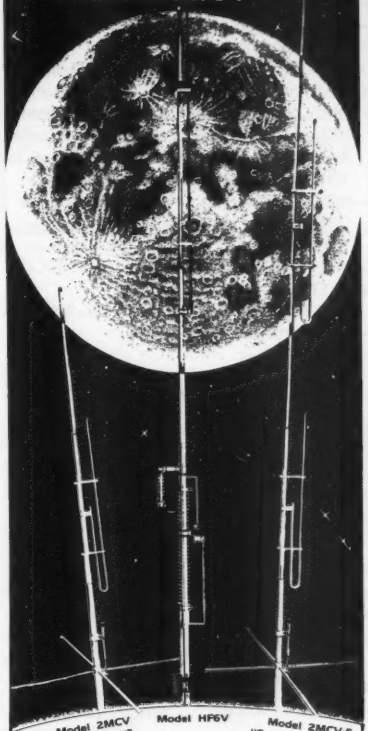

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Identifying the Service

Sometimes, identifying which news service you are copying can be difficult. Most, however, will begin a news item something like this:

NEW YORK JULY 17 (TASS)—THE UNITED NATIONS...

This makes the news service easy to identify—if you know that TASS is one of the Russian agencies. Some are not that easy. A list of agencies and the countries involved is given in Fig. 1. It is by no means complete but should give the first-time monitor a good start at identifying a news service.

I have been able to copy, during the past year, all of the agencies in Fig. 1. With favorable propagation, they should be easily copied.

Identifying weather transmissions is not as easy as press services. Some, when not sending weather data, will slip in a few RYRYs and an ID. Most do not. Some do use a special code at the beginning of each message. If this code is known, then the station can easily be identified. Fig. 2 gives a few examples of these codes.

Some stations alternate RTTY data with FAX and some carry other traffic besides weather. If you know how to read the reporting codes used to identify the weather station that is reporting the data, then you can get a pretty good idea where a transmission is coming from. The book needed to do this is called *National Weather Service Communications Handbook Number 4: Index Numbers for North and Central America, the Caribbean, and U.S. Stations in the Pacific.* The book also contains a condensed listing of worldwide index numbers.

A second book, *Federal Meteorological Handbook Number 2: Surface Synoptic Codes,* will help to decode the weather data. Both books should be available at larger libraries. The weather code, by treaty, is used worldwide. At this writing, some changes are being made in the format of the reports, but the codes should remain unchanged.

It should be noted that while the US and Canada use 74.2 baud for weather transmissions, most of the rest of the world uses 50 baud, with 850-Hz shift being the most common.

As a rule, military transmissions are not printable, but many stations can be identified when they run tests in the clear. Also, a goodly amount of unclassified traffic is transmitted in the clear and is copyable. This seems to be especially true during exercises that "they" want "someone else" to monitor. The best time to catch military stations seems to be the weekends. Then they usually have no traffic and occupy the frequency with an ID and RY or SG tester.

Testers and Callsigns

There are a number of variations in testers used by the commercial stations. The standard QUICK BROWN FOX is used frequently but may have a word or two changed or added. Diplo Paris uses a French tester: VOYEZ LE BRICK GEANT QUE J'EXAMINE PRES DU WHARF, which loosely translates to "see the big ship I am inspecting at the wharf." Probably the most interesting tester is OF ALL THE FISHES IN THE SEA, THE MERMAID IS THE ONE FOR ME. Not all stations use RY testers, either. Some, especially South American, use SG. Many US military stations use a combination of both. At least one station (YBU) uses the shifted RY tester, 46.

Callsigns can look a little strange if you are not used to them. Some examples: Y7A63 (East Germany), ZVK (Brazil), JAN24 (Japan), MSS (Belize), C8J (unknown), IT (unknown), RETJXX (Spain?), FTU8B (France), and the like. "RCC Habana" is not a Russian in Cuba. RCC stands for Radio Corporation of Cuba.

Fig. 3 is a list of some frequencies that have been active at this writing. Frequencies given are close but may vary one or two kilohertz due to the offset of the receiver used. Also, some services seem to shift frequency slightly on an irregular basis. I tried to use the mark frequency, but that did not always work out.

10,408—6VU (Dakar, Senegal) 50 baud/425, nightly
13,487—ANSA (in French and English) 50 baud/425, 1800 UTC
14,508—D4B (Cape Verde) 50 baud/850, 0000 UTC
14,630—ANSA (in French) 2000 UTC
14,640—ZAMINI PRAHA (Czech embassy traffic) code groups, 74.2 baud/425, 1900 UTC and others
14,700—TASS (in English) 1800 UTC
14,880—JMG weather (Japan) 50 baud/850
15,693—ANSA sign on at 1500 UTC
15,724—ANSA sign on at 1500 UTC
15,962—LOL (Argentine Navy) 50 baud/425, sporadic
15,996—DPA (in English) 1630 UTC
16,106—DIPLO PARIS (FZF61) daily during week
16,137—RCC Havana, daily, sometimes with cable traffic
16,187—4UZ (United Nations) 74.2 baud/425, sporadic
16,417—ADN (in Spanish) 2000 UTC
16,440—WBC weather
16,932—CCS (Chilean Navy) 50 baud/850, sporadic
17,610—YBU (unknown) appears weekdays at 2200 UTC. Sign on with ID and QTC number sent via FSK CW followed by coded RTTY.
18,550—NBA (US Navy, Panama) 74.2 baud/850, sporadic
18,650—PAP (Poland) 1700 UTC
18,765—WBC weather

Fig. 3. Some active frequencies. All frequencies are in kilohertz.

Most of the stations in Fig. 3 should be easy to receive. It is only a small sample of what can be copied. If no baud rate and shift are given, then assume 50/425. The times given are approximate and are not necessarily times when the station may appear. They are, however, times that my log shows they were there.

There are a number of good RTTY frequency-listing books available and the serious monitor should have at least one or two. Since frequencies, times, sense, and speed may change from day to day, no book or listing can be completely accurate. But they still can be of enormous help.

Conclusion

Do not expect every RTTY signal heard to yield something printable. At least half of the transmissions found on the air will not print at any combination of speed, sense, or shift. Many are not 5-level codes, some use bit inversion and/or bit shifting (a nice challenge for those who want to change their software), some use SITOR, some use various forms of multiplexing, and some appear to be downright scrambled.

Sometimes it is hard to tell just what is what. Some languages are hard to identify. I have some stuff I have copied that no one yet has been able to identify, after six months of asking!

That is all part of the fun of monitoring RTTY transmissions outside the amateur bands.

Good Luck! And good hunting!■

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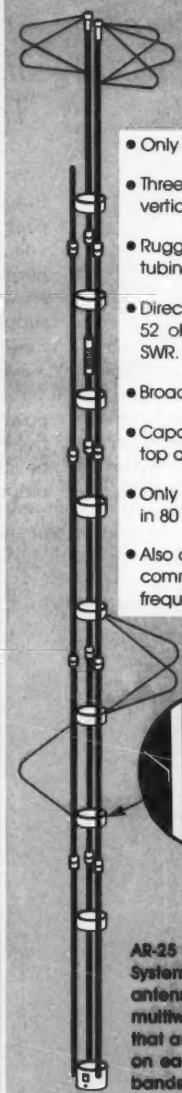

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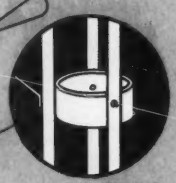

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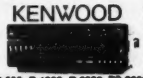

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Any voltage-regulated power supply in the three- to five-Ampere range that can be adjusted to near 15.5-volt output and a fourteen-Ampere-hour motorcycle battery integrated with battery-charging and switching circuits will meet this need. A power supply and battery of these ratings can be easily lifted and carried. The power supply will charge a fully-discharged fourteen-Ampere-hour battery in a reasonable time, and either the battery or power supply will carry the load of a portable rig (such as a hand-held transceiver and rf power amplifier). Appropriate integrating circuitry and a packaging design concept unique to this application will be described.

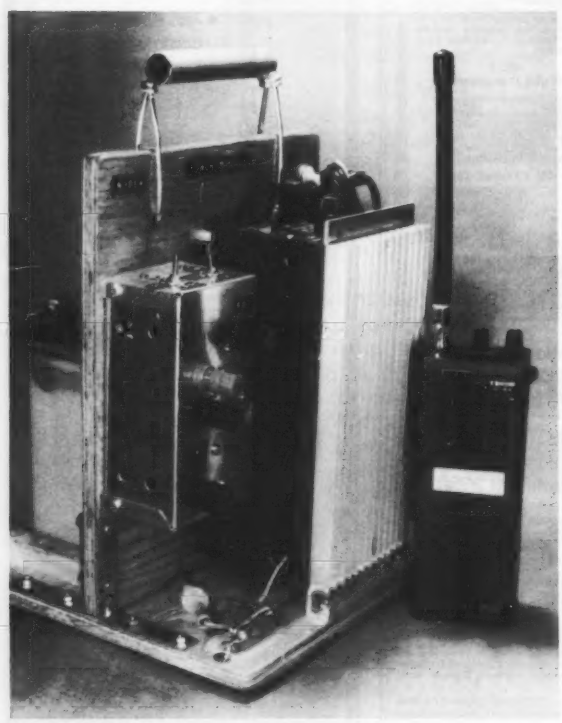

Photo A. Power supply and control box mounted on one side of plywood frame.

The Lead-Acid Battery

Hams have become well acquainted with small completely sealed nicad batteries. The lead-acid battery is a different animal. Although there is one in every automobile, they are not exactly common household (or ham-shack) items. A few words of advice and considerable caution are in order:

- Use *extreme care* in handling batteries. Electrolyte is highly corrosive and will cause serious burns to the skin. Wear safety goggles when handling electrolyte. When diluting sulphuric acid, *always add acid to the water*—and do it *slowly*. If water is added to acid, heat generated in the mixing will cause boiling and splattering.
- Fully charging a lead-acid battery causes some hydrogen and oxygen to be vented as a result of electrolysis. Charge batteries in open, well-ventilated space. Do not smoke or expose a flame or electric spark near a battery being charged.

It is safe to charge an automobile or smaller battery in an open, well-ventilated

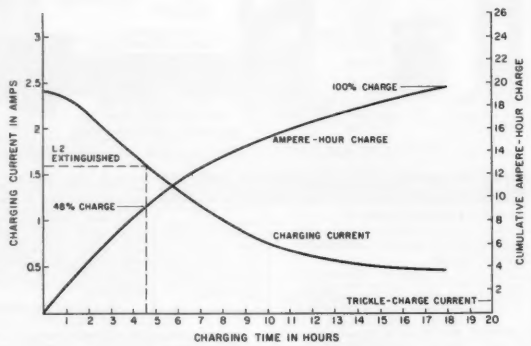

Fig. 1. 14-Ah motorcycle battery charging characteristics.

room, particularly with the constant-voltage method, since the decreasing current as full charge is approached results in only modest gassing. Even so, smoking in the vicinity of a battery being charged *is not advisable.*

It is desirable to have a hydrometer available for checking the specific gravity of the battery electrolyte and to use for replacing water lost by electrolysis. *Use only distilled water* to bring electrolyte up to the proper level. Small hydrometers suitable for the small filler holes in motorcycle batteries are available from auto-parts stores and cycle shops. *Take deliberate care when using the hydrometer*—tiny splattered drops of electrolyte cause nasty corrosion spots on instruments and equipment and surprising "moth holes" in clothing.

Motorcycle batteries are well suited to the power-module application. Their filler holes are sealed, and all cells are vented through one opening and a piece of flexible plastic hose. Although not intended for deep-discharge applications, they will, if properly maintained, give good performance and long life in amateur-radio service. Unlike nicads, lead-acid batteries do not have a memory; they can be discharged to any level and recharged from that level. Low-current overcharging is not harmful and is used normally to ensure maintaining 100% charge. Hence the charge cycle does not have to be carefully timed. Except for the acid electrolyte, lead-acid batteries are quite friendly.

Control and Switching Circuits

Control and switching circuits for the power module must perform the following functions:

- Charge a completely discharged battery in a reasonable time
- After charge, supply a low-current trickle-charge whenever the power supply is energized
- Supply equipment power at a voltage of 13 to 14
- Select either power supply or battery power
- Disconnect the power module from the load

Consider first the battery-charging function. The instructions supplied with motorcycle batteries specify constant-current charging with current values of approximately one-tenth the Ampere-hour rating for periods of from 10 to 16 hours. With the power supply as a charger, constant-voltage charging must be used (as is standard for vehicular charging equipment). In constant-voltage charging, the charging current is several times the constant-current value at the beginning of charge and tapers to a fraction of the constant-current value for the last 35% of the total charging time (while the battery is receiving the last 10% to 15% of charge). A charging voltage of 15.5 will fully charge the battery in nearly the same time specified for constant-current charging.

With a charging voltage this high, the initial current must be limited to prevent damage to the power supply and to prevent shortening the life of the battery. Current limiting can be provided with a low-value series resistor.

Total charging time can be considerably reduced if the resistor is nonlinear so as to provide a high resistance when passing high values of current and practically no resistance at low current. By a happy coincidence, a standard 6-volt, 24-Watt, high-intensity incandescent lamp (no. 1133) has a resistance characteristic exactly suited to a 14-Ah battery being charged at 15.5 volts. With the lamp as a series resistor, charging is accomplished with the "constant-voltage, current-limited" method.

A graph of the charging characteristics of a completely discharged 14-Ah battery is shown in Fig. 1. Charging current limited to 2.4 Amps approaches a constant 0.4 Amps in 15 hours. Complete charging requires about 18 hours. The 0.4-Amp final current is too high for a trickle charge, but a lower charging voltage would prolong charging time. Therefore, a means of reducing to trickle-charge current must be provided. (Will anyone

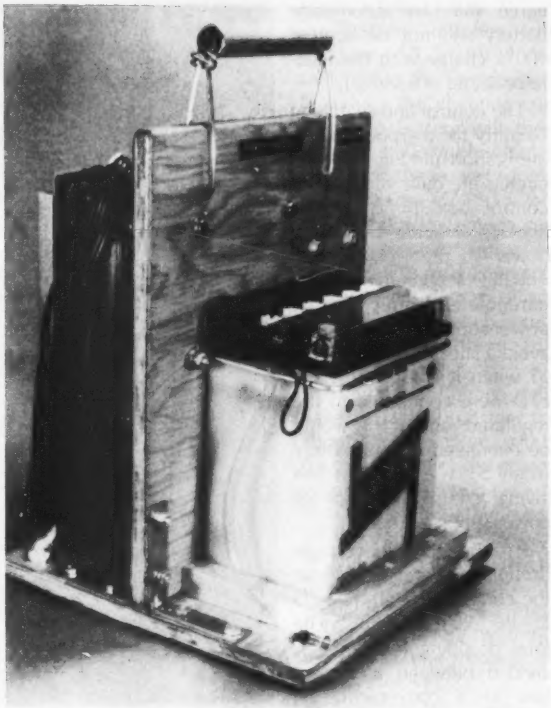

Photo B. Motorcycle battery isolated from electronic equipment by vertical member of frame. Battery is mounted in shallow well and secured at the top with an aluminum-wire bracket. All cells are vented through the plastic tube on the side of the battery and directed away from the frame.

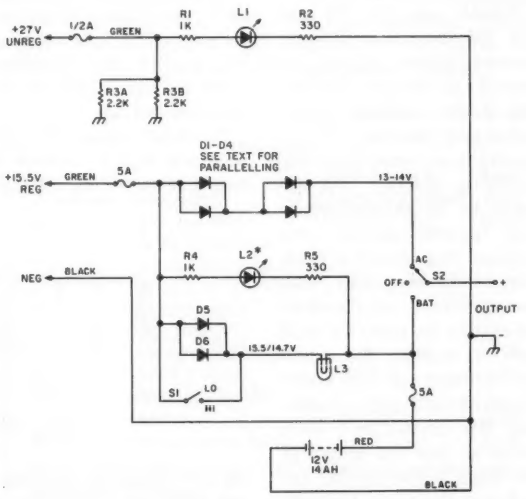

Fig. 2. Power-module control circuits.

agree that an automobile battery will not be kept at 100% charge with the regulator set at 14.6 volts?)

The control and switching circuitry for the power module is shown in Fig. 2. These circuits are built into a small control box. L1 is a pilot light to indicate when the power supply is energized. The LED is connected to the unregulated input to the power-supply regulator to avoid a sneak circuit through S1 when it is closed. If the LED were connected to the regulated output, it would be energized by the battery when S1 was closed, thus giving a false indication of power-supply status.

R1 and R2 are voltage-dropping resistors to limit the current through the LED to the 20-mA rating. The total dropping resistance is divided between two resistors as a convenience in mounting the LED, which is snug fitted through a 3/16"+ hole in the control-box panel. One resistor soldered to each terminal makes the electrical connection as well as providing a mounting stiff enough to hold the LED in place. R3 is a bleeder resistor across the very large filter capacitor in the power supply to shorten the time the pilot light glows after the 60-Hz power is removed. (See Fig. 3.)

Diode pairs D1, D2 and D3, D4 drop the 15.5-volt power-supply output to from 13 to 14 volts. Paralleling diodes without series-equalizing resistors violates generally-accepted good engineering practice, but appears to be satisfactory in this specific design. The voltage drop across a number of diodes under load was measured and found to be exactly the same for each one. In making the parallel connections, the entire length of each lead was used, and the connections were made so that the length of the leads in the parallel circuit was the same for both resistors.

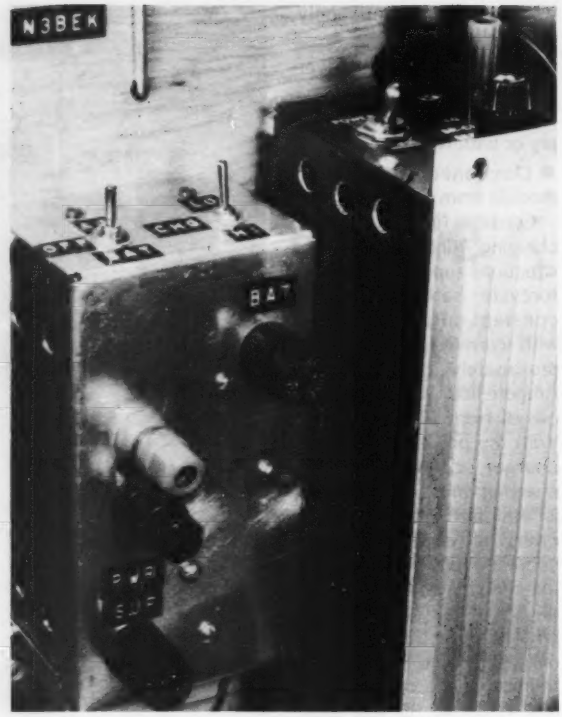

Photo C. Panel and control details. Switches are conveniently accessible on the top of the control box.

The maximum current expected to be passed through a pair of parallel diodes is under 4 Amps. Even if the current is not shared equally, the current in any one diode should be below the 3-Amp rating. The diodes run quite hot with only 2 Amps through a single unit. To help dissipate the heat, each pair is held flat against the side of the chassis by a flat washer and machine screw through a hole at the center of the pair.

Paralleled diodes D5 and D6 along with S1 provide a means of switching the battery-charging voltage from 15.5 for full charging to 14.7 for "high-trickle" charging. For continuous operation, a trickle-charge voltage of 13.8 is recommended. However, since the power module will not normally be operated for extended periods, the higher voltage that results in about a 120-mA trickle is considered appropriate. The diodes also block reverse current from the battery into the power supply when S1 is open.

Lamp L3 is the nonlinear, current-limiting resistor. Lamp L2 and resistors R4 and R5 provide a gross measure of the battery-charging current. L2 glows at full brilliance when the charging current exceeds 2.2 Amps and is extinguished below 1.6 Amps. The combined resistance of R4 and R5 limits the current through the LED to under the 20-mA rating. Switch S2, SPDT center off, provides an on/off and ac/dc switching function.

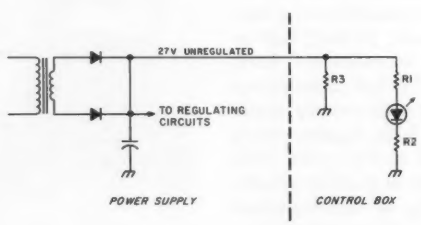

Fig. 3. Without R3, the filter capacitor discharges very slowly and keeps the LED lit long after the power supply is turned off.

Mechanical Design

A practical means must be found for assembling the power supply, battery, and control box into a convenient portable package. An enclosed carrying case cannot be used because the power supply must be open to ventilation (to prevent overheating), and it is not safe to charge a battery in a confined space. The battery should be physically separated from electronic equipment.

The photos show the easy solution arrived at: The components are mounted on an inverted-T frame made of two pieces of ½" plywood. The pieces of plywood are dressed up with two protective coats of varnish prior to assembly. The 9" × 9" base and 10½"-high vertical pieces are tailored to the specific power supply available, a Standard Communications Corp. Model SR-C12/120-5R. Other models may require some modification in the dimensions of the frame and the mounting configuration. The frame must be strong and rugged. The 14-Ah battery weighs close to 10 lbs. The power supply will weigh from 5 to 10 lbs. Do not assemble the frame with wood screws. Use machine screws to fasten two 2½" corner brackets at each edge of the vertical piece, as shown in the photos.

The battery is mounted on one side of the T in a well made of three pieces of 5/8" × 5/8" wood fastened to the base with 1" brads and is secured at the top with a no.

10 aluminum-wire retainer fastened to the frame with machine screws. The power supply and control box are mounted on the other side of the frame, with the control box flat against the frame and the power supply spaced away from the frame to allow good ventilation.

The large, comfortable carrying handle is a 4½" piece of ¾"-o.d., 1/16"-thick aluminum tubing. The tubing is secured to the frame with no. 10 aluminum wire through ¼" holes in the frame. Metal furniture-leg domes, ¾" in diameter, hammered into the underside of each corner of the base, make smooth, strong feet. Two large cup hooks are screwed into the top of the frame and front edge of the base. The ac power cord is stowed around these hooks.

A protective carrying cover was made from a single piece of cardboard cut from a large shipping carton and folded into the proper shape. The cover is held in shape with duct tape along the inside seams, the outside vertical corners, and around the bottom edges. The result is an open-bottom cover 9½" × 9½" × 11" high. It was made water repellent with two coats of Varathane liquid plastic. The cover fits snugly over the frame with the handle protruding through a slot in the top.

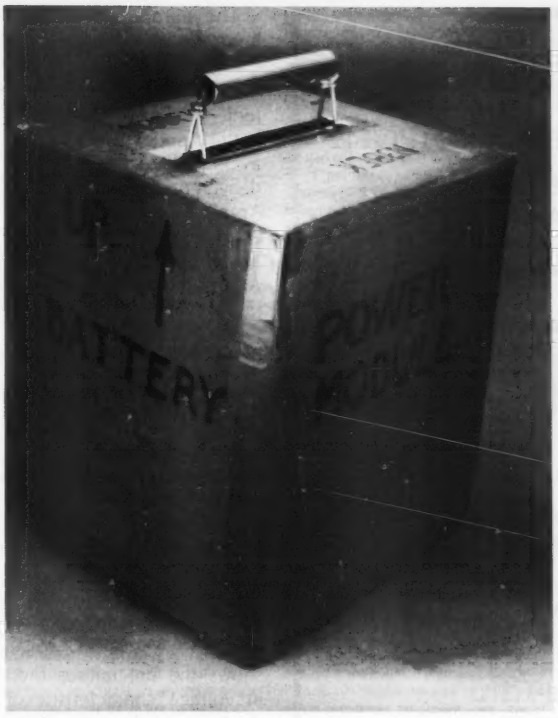

Photo D. Protective cover in place with carrying handle protruding through the slot in the top.

Operation

Operation of the power module is straightforward. The primary power switch is located on the power-supply control panel. The three-position switch on the control-box panel connects the output terminals to either ac or battery power. In the off position, it removes load from the battery and also allows battery charging without energizing the output terminals. Only the battery-charging feature requires some explanation.

Battery charging is accomplished by switching S1 to the high position and energizing the power supply. If the battery is less than half-charged, L2 will glow until the charge current is reduced to 1.6 Amps. (Disregard any short transient glow caused by the high inrush current when the power supply is turned on.) A fully-discharged battery will require a charging time of about 4.5 hours to extinguish L2. (See Fig. 1.) An additional 13 to 14 hours will be required to reach 100% charge. When the battery reaches full charge, S1 should be switched to the low position to reduce the charging current. The battery will then remain on trickle-charge whenever the power supply is energized.

The following criteria can be used to determine when the battery is fully charged:

- The electrolyte must gas (bubble) moderately but continually to achieve full charge.
- The battery voltage must have remained constant for about 1½ hours at within 0.2 to 0.3 volts of the power-supply output voltage on high charge, or within 0.8 to 0.9 volts on low charge.
- The specific gravity of the electrolyte in a fully-charged battery as measured by a battery hydrometer is 1.260 *at room temperature* (68° F).
- Although not a good indication of overall battery condition, the open-circuit voltage of a fully-charged battery after resting unloaded for 24 hours will be at least 13.0.

Maximum life and Ampere-hour capacity will be achieved by keeping the battery as near fully charged as possible at all times. Do not let the battery stand discharged. A battery standing idle will lose in the order of ½% to 1% of its charge per day. An unused battery should be brought to full charge every 30 days.

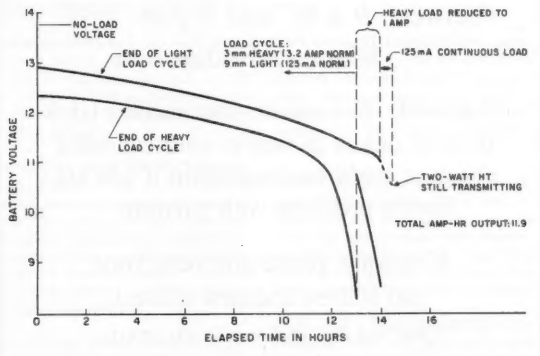

Fig. 4. 14-Ah motorcycle battery discharging characteristics.

Parts List

Component	Description	Radio Shack # (# of items in packets)	Total Cost
D1–D6	50-V, 3-A diode	276-1141 (2)	$2.37
R1,2,4,5	¼-Watt resistors	(5)	.39
R3A, 3B	½-Watt resistors	(2)	.19
L1,2*	LEDs TLR-107	276-033 (2)	.89
LS	High-intensity lamp, 6 V, 24 Watts, #1133	(2)	3.79
S1	SPST, 3 Amp	275-612	1.69
S2	SPST, Center Off, 10 A	275-325	2.39
Battery	Yuasa LB14L-A2		27.00

*L2 at full brilliance above 2.2-Amp charging current, extinguishes at 1.6 Amps.

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The number of Ampere-hours delivered by a fully-charged battery depends on the value of the load current. A 14-Ah motorcycle battery under a continuous average load of one Amp delivered approximately 14 Ampere-hours when discharged to ten volts. With an average load of two Amps, the output dropped to 13 Ampere-hours. A continuous load to full discharge is not representative of battery operation in amateur-radio service. A more typical test was run with a repetitively-cycled load of 3.2 Amps (transmit) for 3 minutes followed by 125 mA (receive) for 9 minutes. The reults of this test are plotted in Fig. 4, showing the battery voltage at the end of each light- and heavy-load cycle.

The heavy-load curve shows the precipitous drop in voltage characteristic of the lead-acid battery after it reaches about eleven volts. When the battery was fully discharged by the 3.2-Amp load, the heavy-load cycle was reduced to 1 Amp, after which a useful value of voltage was delivered for an additional half hour. At the end of the fourteenth hour, the load was reduced to 125 mA continuous, the load of a hand-held transceiver operating on a "mobile stand." After a half hour on this load, the transceiver delivered rated two-Watt output with the battery voltage at 10.5—there was still some usable charge available. This discharge performance represents a lot of HF, QRP, or VHF operation.

The contribution to this project made by Jim King WB3JZI is gratefully acknowledged. The original idea for the portable power module was his. He suggested the battery-charging circuit, supplied some parts, and helped with testing along the way to the final design. Also, photography is by Jim King.■

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REPAIR, alignment, calibration. Collins written estimates, $25; non-Collins, $50. K1MAN, (207)-495-2215. BNB117

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900–2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont NY 10538. BNB123

NEW HAM-SWL SOCIETY for unity of thought & learning. Open to all. Many topics, awards, free ad space in periodical, society net, museum participation. Shack pics & QSLs welcome. Writers needed. SASE for info to RCSW, 32 Applegate, Bennington VT 05201. BNB197

SCHEMATICS: Radio receivers 1920s/60s. Send name, brand, model no., SASE. Scaramella, PO Box 1, Woonsocket RI 02895-0001. BNB214

HAM RADIO REPAIR, tube through solid state. Robert Hall Electronics, PO Box 8363, San Francisco CA 94128; (408)-729-8200. BNB219

HAM TRADER YELLOW SHEETS, in our 23rd year. Buy, swap, sell ham-radio gear. Published twice a month. Ads quickly circulate—no long wait for results. SASE for sample copy. $9 for one year (24 issues). POB 356, Wheaton IL 60189. BNB220

DX HEADING MAPS for Boston, NYC, Phila., Baltimore, Detroit, Atlanta, Chicago, New Orleans, Saint Louis, Dallas, LA. 11 × 17 $1.75 pp. 22 × 34 $5.95 pp. Specify city. Bill Massey W2HOJ, PO Box 397, Hainesport NJ 08036. BNB221

COMMODORE 64 CW INSTRUCTOR PROGRAM. Generates CW on TV speaker. Random code, keyboard input, or prerecorded "CW Tests." Character speed and spacing set independently. Designed for classes and increasing code speed. $15.00—diskette or cassette (specify). N7BCU, Dennis Oiver, 22000 S. Tonya Ct., Beavercreek OR 97004. BNB249

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COCO OWNERS—Free software and hardware brochure. CoCoNuts, POB 9866, San Jose CA 95157-0866. BNB265

COMPREHENSIVE RTTY, ASCII, CW software package for TRS-80 models I/III/4. Free brochure. KCQ Software, 6319 Boeuf Trace, Alexandria LA 71301. BNB270

CASH PAID for traffic/speed radar equipment. Write or call: Brian R. Esterman, PO Box 8141, Northfield IL 60093; (312)-251-8901. BNB271

REPEATER VOTER: Four-channel expandable signal-to-noise voter card. The voter selects the best signal from the audio. Just give it COR and audio and it returns the best signal. All multiple-receiver repeaters should have one. Commercial design. For more information write: Voter, Hall Electronics, 815 E. Hudson St., Columbus OH 43211. BNB274

KENWOOD 430S owners only! Stop Scan—when the squelch breaks, the scan stops! Adjustable resume scan delay. No modifications! Kit $25, assembled $35. JABCO, R1 Box 386, Alexandria IN 46001. BNB275

WHY SELL IT? You can donate that unwanted equipment, get the tax break, and feel like a million. Contact the kids learning English via amateur radio at Junior High 22 on Manhattan's Lower East Side. WB2JKJ, Junior High School 22 ARC, 111 Columbia Street, New York NY 10002. BNB276

COPY SATELLITE PHOTOGRAPHS, weather maps, and press on our military-surplus facsimile recorders. Recorders are solid-state, dual-speed, and fully automatic. Catalog available. Atlantic Sales, 3730 Nautilus Ave., Brooklyn NY 11224; (718)-372-0349. BNB280

DIGITAL AUTOMATIC DISPLAYS for FT-101s, TS-520s, Collins, Swan, and all others. Six 1/2" digits in a 5" wide by 1-1/2" high and 9" deep metal cabinet. Send $1.00 for information. Grand Systems Dept. A, PO Box 3377, Blaine WA 98230. Canadians contact VE7LB. BNB282

ATLAS 350XL OWNERS GROUP. Free newsletter. Send QSL with rig s/n and SASE. Know people who repair them? Information to share? Questions? Rod N5NM, Box 2169A, Santa Fe NM 87501. BNB291

KNOW FIRST! You need the *W5YI Report*, a twice-monthly award-winning hot insider ham-radio newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts! Quoted coast-to-coast! We print what you don't get elsewhere! $21.00 annually w/money-back guarantee! SASE (2 stamps) brings free sample. *W5YI Report*, PO Box #10101, Dallas TX 75207. BNB294

NEW VE PROGRAM QUESTIONS—booklet contains the current FCC Amateur Radio Operator Study Guide and all 1600 *actual* test questions for *all* ham classes (Novice though Extra class). $3.00 postpaid. *W5YI Report*, PO Box #10101, Dallas TX 75207. BNB295

1985 "BLOSSOMLAND BLAST," Sunday, October 6, 1985. Write "BLAST," PO Box 175, St. Joseph MI 49085. BNB296

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick, Dept. 539, 230 Woods Lane, Somerdale NJ 08083. BNB297

NEW Grant AM/SSB CB with power mike, $125. R. D. Carter, PO Box 418, Vass NC 28394. BNB298

TI 99/4A random, text, keyboard, send, receive, code-practice programs. Dr. Code "General" sends International Morse Code and prints on screen; you choose speed, tone, which characters to be sent, spacing, and more! Dr. Code "Speech" is the same as "General," with speech; you choose how many characters before speech check. For cassette of both copyrighted programs and conditional copying privileges, send $10.00 plus $3.00 shipping and handling to N5ESF, Rt. 1, Box 1326, Lake Charles LA 70601. Phone (318)-436-2048, no collect calls please; satisfaction or money back. BNB299

THE KANSAS CITY DX CLUB invites all DX and contest enthusiasts to its 5th-floor Stouffers Hotel Hospitality Suite during this year's Dayton Hamvention. Continuous CW pileup contest, DX trivia contest, DX video room, and refreshments—Friday and Saturday starting at 7:00 pm. BNB300

ONTARIO HAMS. Fast repair of all types of amateur equipment. Specialize in complete overhaul and alignment. Equipment pickup and return via UPS. Ralph VE3UY, (519)-836-1735. BNB301

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COMPLETE two-meter repeater with Advanced Computer Controls RC-850 controller, full telemetry, link radio, and many other extras for sale. Excellent condition. Doug Zastrow WB0UPJ, 1702 Alaska, Norfolk NE 68701. Phone (402)-379-3166 days, (402)-379-1166 evenings. BNB303

MAYBE THIS AD IS FOR YOU... Burglar Alarms... easily learned. Terrific employment-business opportunities. Get in now. Starting information $2. Security Electronics International, PO Box 1456-GX, Grand Rapids MI 49501. BNB304

SSB CRYSTAL FILTERS, 9.0 MHz, 2.4-kHz bandwidth, 6 pole, $17.50, two for $30.00. 4CX250B chimneys, $5.00, three for $12.00. ICL7117 LED DVM chips, $8.00, three for $20.00. Dentron CAP transceiver, 100 Watts, solid state, $275; ACPS, $85; GLA1000-C linear, 160–15 + 10, $285. All items new, postpaid, data. National receiver collection, SASE list. Wanted: automobile radio vibrators, new. W. E. Delage, PO Box 493, Northfield OH 44067; (216)-274-2012. BNB305

CODE-PRACTICE PROGRAMS diskette for IBM PC, PCjr. $10 pp. Andrew Modla/73, 5 Derby Place, Newtown PA 18940. BNB306

TUBES: Sell fifty-year collection—receiving and transmitting. Send list of requirements for availability and price quotes. M. Levy W5QJT, 4141 Krupp Drive, Apt. One, El Paso TX 79902. BNB307

FTDX400 TRANSCEIVER—200 Watts, excellent condition, with manual. Ideal for new ham or old-timer. Built like a battleship. Needs only TLC from owner. W1XU, Box 186, Peterborough NH 03458; (603)-924-6759. BNB308

HIGH-QUALITY, LOW-COST courtesy beepers for your transmitter or repeater. Kit $14, assembled $18 F.O.B. YBM Enterprises, 8502 N. Oketo Ave., Niles IL 60648. BNB309

FIND OUT what else you can hear on your general-coverage transceiver or receiver. Join a shortwave radio listening club. Complete information on major North American clubs and sample newsletter, $1.00. Association of North American Radio Clubs, 1500 Bunbury Drive, Whittier CA 90601. BNB310

ICOM 730, mint, guaranteed, $650. Computer hardware and software. Check our prices before buying. AVEX Computers, 2445 Cleveland Avenue, West Lawn PA 19609; (215)-674-9559. BNB311

HAM HELP

Does anybody have information on how to build a ferrite-bead antenna?

Marvin Rosen N3BQA
20 W. Madison Street
Baltimore MD 21201

I need 211 (311, VT4C) tubes and meters from a BC-375 transmitter.

Robert S. McMullen N6FVN
24 W. 58 Terrace
Kansas City MO 64113

Can anyone provide assistance or information in converting the HyGain 3750 to using the 6146 tube?

Also, I desperately need a 19-kHz crystal for the RCA stereo FM signal simulator model WR-52A. I will pay any reasonable price for the information.

Connie Mercer NG4C
403 Pershing Drive
WSMR NM 88002

SPECIAL EVENTS

Listings in this column are provided free of charge on a space-available basis. The following information should be included in every announcement: sponsor, event, date, time, place, city, state, admission charge (if any), features, talk-in frequencies, and the name of whom to contact for further information. Announcements must be received by 73 Magazine by the first of the month, two months prior to the month in which the event takes place. Mail to Editorial Offices, 73 Magazine, Pine St., Peterborough NH 03458.

KEARNEY NE
MAR 30–31

The Midway ARC of Kearney, Nebraska, will hold its 8th annual ARRL Spring Convention on March 30–31, 1985, at the Holiday Inn, Kearney NE. The Friday-night preactivity will be the North American Teleconference Radio Network live from the Holidome. During the weekend there will be symposia on AMSAT, packet radio, and frequency coordination and RFI. There will be alternate activities for non-hams. There will be a banquet, Four Keys music, ventriloquism, Belvin B. Bump's humor, and more. For more information, contact MARC, PO Box 1231 Kearney NE 68847.

PUTNAM COUNTY IN
APR 6

The Putnam County Amateur Radio Club will hold its third annual auction and flea market on April 6, 1985, beginning at 8:00 am, at the Putnam County Fairgrounds, north of Greencastle IN. Admission for this all-indoor event is $3.00 per person and children under 12 are free. Flea-market tables are $2.00 each. Setup begins at 6:00 am. The auction will begin at 1:00 pm. Food and drink will be available. For more information, send an SASE to John S. Underwood K9IIB, RFD 1, Box 10, Fillmore IN 46128; (317)-246-6335.

KANSAS CITY MO
APR 13–14

The PHD Amateur Radio Association will sponsor the Missouri State ARRL Convention on Saturday and Sunday, April 13–14, 1985, from 9:30 am to 5:30 pm (both days), in the Trade Mart Building II, located at the downtown Kansas City MO airport. Registration is $4.00 (good for both days) and swap tables are $10.00 (for both days; includes one registration). Forums will include: ARRL, computer, FCC, VE, DX, PR, QCWA, and AMSAT. Homebrew and CW contests will also be held. Both the flea market and the commercial booths will be inside the 45,000-square-foot building. A banquet will be held on Saturday night at the Gold Buffet ($10.50). Talk-in on 146.34/.94. For further information or pre-registration, send an SASE to PHD Amateur Radio Association, PO Box 11, Liberty MO 64068-0011, or phone (816)-781-7313 or (816)-452-9321.

RALEIGH NC
APR 14

The 13th annual Raleigh Amateur Radio Society Hamfest will be held on April 14, 1985, at the Jim Graham Building, NC State Fairgrounds, Hillsborough Street, just west of the Raleigh Beltline, Raleigh NC. Admission is $3.50 in advance (until April 1) and $5.00 at the door. Flea-market spaces are $5.00 (includes a table and two chairs). Dealers can set up on Saturday, April 13, from 4:00 to 10:00 pm, and on Sunday, April 14, from 6:00 am to 8:00 am. There will be QCWA, MARS, and ARRL-NTS meetings, CW and home-brew contests, and ARRL and RARS booths. Talk-in on 146.04/.64 (W4DW) and 146.28/.88 (K4ITL). For pre-registration flyer or dealer information, contact Rollin Ransom NF4P at (919)-779-5021 or Jim Bradley WA4AOO at (919)-851-2437, or write to RARS, PO Box 17124, Raleigh NC 27619.

HOSARC 12TH ANNIVERSARY
APR 14

The Hall of Science ARC (HOSARC) will issue a commemorative certificate to anyone working a HOSARC station between 1500 and 2100 UTC on April 14, 1985. This special event celebrates HOSARC's 12th anniversary. Stations using WB2JSM will operate CW in the first 25 kHz of the 40-, 15-, and 10-meter Novice bands and in the first 5 kHz of the 30-meter band. Stations using WB2ZZO will operate in the first 25 kHz of the 40-, 20-, 15-, and 10-meter General phone bands. Send a QSL and a large SASE (40 cents or 1 IRC) to HOSARC, PO Box 131, Jamaica NY 11415, or to HOSARC QSL Manager Arnold Schiffman WB2YXB, 81-22 250th Street, Bellrose NY 11426.

WEST HARTFORD CT
APR 14

The Pioneer Valley Radio Association will hold its eighth annual flea market on Sunday, April 14, 1985, from 10:00 am to 4:00 pm, at Conard High School, Berkshire Avenue, West Hartford CT. Features include volunteer exams, lectures on computers and Basic programming, an auction, food, and free parking. Tables are $10.00 in advance and $12.00 at the door. Talk-in on 146.19/.79. For further information or for reservations, contact Jon Patz KA1FYL, 34 Whiting Lane, West Hartford CT 06119, or call (203)-232-8772 evenings.

BEDFORD PA
APR 14

The Bedford PA, Altoona PA, Somerset PA, and Cumberland MD Amateur Radio Clubs and the Blue Knob Repeater Association will sponsor the third annual Southern Alleghenies Hamfest on Sunday, April 14, 1985, from 7:00 am to 4:00 pm, at the Bedford County Fairgrounds, one mile west of Bedford on Route 30 and one half mile west of the Route 220 Bypass (close to the Bedford Exit of the PA Turnpike). Admission is $3.00, tables are $5.00, and outside tailgate spaces are $2.00. Dealers can set up the day before. Talk-in on 145.49/.89, 444.2 +5 MHz, and 146.52. For more information, contact Joel Cunard KB3TR, RD 6, Box 104, Bedford PA 15522; (814)-623-9697.

FRAMINGHAM MA
APR 14

The Framingham Amateur Radio Association, Inc., will hold its annual spring flea market on April 14, 1985, beginning at 10:00 am, at the Framingham Civic League Building, 214 Concord Street (Route 126), Framingham MA. Sellers can set up at 8:30 am. Admission is $2.00 and tables are $10.00 (which includes one free admission) and pre-registration is required. Food will be available. Talk-in on .75/.15. For more information, contact Joe Weiner K1VVC, 52 Overlook Drive, Framingham MA 01701; (617)-877-7166.

WOOD COUNTY WV
APR 14

The second annual NWWVRA Hamfest will be held on April 14, 1985, from 8:00 am to 4:00 pm, at the Wood County 4-H Grounds. There will be an all-indoor flea market and dealers are welcome. Admission is $3.00 and flea-market spaces are $3.00 each. There will be food and XYL activities. Talk-in on 147.360/.960. For further information, send an SASE to Jim Whitlatch, 5007 Elmwood Avenue, Parkersburg WV 26101, or call (304)-422-7157.

ARBOR DAY
APR 15–21

Special-event stations will be operating from Nebraska City NE, beginning at 2400 UTC on April 15, 1985, and ending at 0600 UTC on April 21, 1985, to commemorate Arbor Day. Nebraska City is the home of Mr. J. Sterling Morton, the founder of Arbor Day. All amateurs contacting these stations will be eligible to receive a commemorative certificate from the Nebraska City Amateur Radio Club. Stations will be operating in the General portion of the 80- and 10-meter phone and CW bands. SWLs can participate also. Send an SASE and your QSL card to Nebraska City Radio Club, PO Box 8, Nebraska City NE 68410.

SOMERSWORTH NH
APR 20

The Great Bay Radio Association will sponsor the Springfest 85 flea market/hamfest on Saturday, April 20, 1985, from 9:00 am to 3:00 pm, at the Somersworth Armory, Blackwater Road, Somersworth NH. Admission is $1.00 and tables are $8.00 (includes one admission). There will be food and free parking. Talk-in on 146.40/147.00. For table reservations or more information, write to Great Bay Radio Association, PO Box 911, Dover NH 03820.

GRAND JUNCTION CO
APR 20

The Grand Mesa Repeater Society will hold the sixth annual Western Slope Amateur Radio and Computer Swapfest on Saturday, April 20, 1985, from 10:00 am to 4:00 pm, at a location to be disclosed later, in

CM

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—J. Trenbick

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—Fred Blechman, K6UGT

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Grand Junction CO. Admission is free and tables are $5.00 each. Features include an indoor swapfest, exams, an auction, and refreshments. Talk-in on 146.82 and 449.200. For further information or to reserve a table, send an SASE to Larry Brooks W0ECV, 3185 Bunting Avenue, Grand Junction CO 81504; (303)-434-5603.

ROCHESTER MN
APR 20

The Rochester Amateur Radio Club will sponsor the 8th annual Rochester Area Hamfest on Saturday, April 20, 1985, beginning at 8:30 am, at John Adams Junior High School, 1525 NW 31st Street, Rochester MN. There will be a large indoor flea market, refreshments, and free parking. Talk-in on 146.22/.82 (W0MXW). For further information, contact the RARC, c/o WB0YEE, 2253 Nordic Ct. NW, Rochester MN 55901.

FLEMINGTON NJ
APR 20

The Cherryville Repeater Association will sponsor the Flemington NJ Hamfest on Saturday, April 20, 1985, from 8:00 am to 3:00 pm, at the Hunterdon County High School Field House, Route 31, Flemington NJ. Admission is $3.00. Breakfast will be available from 6:30 am. Exams will be given. Talk-in on 147.975/.375, 147.615/.015, 222.52/224.12, 449.850/444.850, and 146.52. For more information or for table reservations, contact Bill Inkrote K2NJ, RD 10, Box 294, Quakertown-Croton Road, Flemington NJ 08822; (201)-788-4080.

MADISON WI
APR 21

The Madison Area Repeater Association, Inc. (MARA) will host its thirteenth annual Madison Swapfest on Sunday, April 21, 1985, beginning at 9:00 am, at the Dane County Exposition Center Forum Building, Madison WI. Commercial exhibitors and flea-market sellers can set up beginning at 8:00 am. Admission is $2.50 in advance and $3.00 at the door. Children 12 and under are admitted free. Flea-market tables are $4.00 in advance and $5.00 at the door. There is parking available in the adjacent paved lot and hotel accommodations are available within walking distance of the swapfest. There will be a large variety of equipment and components for hams, computer hobbyists, and experimenters. An all-you-can-eat pancake breakfast and a barbecue lunch will be available. Talk-in on 146.16/.76. For reservations or more information, contact MARA, PO Box 3403, Madison WI 53704.

BRAINTREE MA
APR 21

The South Shore Amateur Radio Club of Braintree MA will hold an indoor flea market on Sunday, April 21, 1985, from 11:00 am to 4:00 pm, at the Viking Club, 410 Quincy Avenue, Braintree MA. Admission is $1.00 and 8-foot tables are $10.00 each (includes one free admission per table). For more information or to purchase tables (make checks payable to the South Shore Amateur Radio Club; there is no cancellation refund after April 17, 1985), contact Ed Doherty W1MPT, 236 Wildwood Avenue, Braintree MA 02184; (617)-843-4431.

DAYTON OH
APR 26

The Dayton/Cincinnati Quarter Century Wireless Association Chapter 9 will hold its annual banquet in conjunction with the OOTC and the Dayton Hamvention on Friday, April 26, 1985, at 7:30 pm, at Neils Heritage House, 2189 S. Dixie Drive, Dayton OH. There will be a cash bar beginning at 6:30 pm. Tickets are $12.50 per person. For reservations or tickets, contact Bob Dingle, Secretary/Treasurer, 657 Dell Ridge Drive, Dayton OH 45429; (513)-299-7114.

DAYTON OH
APR 26

The 16th annual B*A*S*H will be held the night of Friday, April 26, 1985, at the Convention Center, Main and Fifth Streets, Dayton OH. Admission is free to all. Parking is available in the adjacent City Garage. There will be sandwiches, snacks, and a cash bar. There will also be live entertainment. For more information, contact the Miami Valley FM Association, PO Box 263, Dayton OH 45401.

FITCHBURG MA
APR 27

The Montachusett Amateur Radio Association will hold a flea market on Saturday, April 27, 1985, from 9:00 am to 3:00 pm, at the Knights of Columbus Hall, Electric Avenue, Fitchburg MA. Admission is $1.00 and tables are $8.00 each. Sellers can set up at 8:00 am. Talk-in on 144.85/145.45 and 146.52. For table reservations or more information (make check payable to M.A.R.A.), contact Jim Beauregard, 7 Mountain Avenue, Fitchburg MA 01424.

WEBSTER MA
APR 28

The Eastern Connecticut ARA will hold its annual flea market on April 28, 1985, at the Point Breeze Restaurant on Webster Lake, near Exit One (Route 395) on Route 193, Webster MA. Talk-in on 147.225/.825 or .52 direct. For further information, contact either Dick Spahl K1SYI at (617)-943-4420 (after 7:00 pm), or Don Amirault K1APE, RR 1, Box 310, Thompson CT 06277; (203)-923-2727.

150TH ANNIVERSARY
SPECIAL EVENT
VICTORIA, AUSTRALIA

A special commemorative callsign, VI3WI, part of the 150th anniversary celebration of the European settlement in Victoria, will be on the DX bands until at least April 30, 1985. VI3WI will be activated on a roster basis by selected members of the Wireless Institute of Australia and its affiliated clubs. All DX bands and all modes will be used and a commemorative QSL is available, either direct or via the VK3 QSL Bureau. A special award certificate is also available for radio contact with Victoria between November, 1984, and April 30, 1985. Contact (SWLs log) one station in VK3 during the award period to qualify. A QSL card for the qualifying contact, endorsed with a congratulatory message on Victoria's 150th anniversary, plus $2.00 or equivalent, should be sent to Victoria 150 Award, Wireless Institute of Australia, 412 Brunswick Street, Fitzroy 3065, Victoria, Australia.

CEDARBURG WI
MAY 4

The Ozaukee Radio Club, Inc., will sponsor its seventh annual swapfest on Saturday, May 4, 1985, from 8:00 am to 1:00 pm, at the Circle B Recreation Center, Highway 60, Cedarburg WI (20 miles north of Milwaukee). Admission is $2.00 in advance and $3.00 at the door. Four-foot tables are $2.00 each and are available in advance only. Refreshments will be available. Seller setup begins at 7:00 am. For tickets, tables, maps, or more information, send a business-size SASE to 1985 ORC Swapfest, 101 E. Clay Street, Saukville WI 53080.

ROGERS AR
MAY 4

The Northwest Arkansas Amateur Radio Club, Inc., will hold its fifth annual hamfest/swapfest on Saturday, May 4, 1985, from 8:00 am to 4:00 pm, at the Rogers Youth Center, 315 West Olive, Rogers AR. Setup begins at 7:00 am. Admission is free, and commercial and flea-market tables are $2.00—first come, first served. Talk-in on 146.16/.76 and 146.52 simplex. For more information, send an SASE to either Ray Watson N5HAP, 714 Maple Drive, Springdale AR 72764, or to Dave Perry KE5QZ, 3201 N. 13th Street, Rogers AR 72756.

BEMIDJI MN
MAY 4

The Bemidji Amateur Radio Club will hold its annual hamfest/swapfest on Saturday, May 4, 1985, from 9:00 am to 4:00 pm, at the Middle School cafeteria, Bemidji MN. Licensing exams will be given. Talk-in on 146.13/.73. For more information, write

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Jerry Pottratz, Bemidji Amateur Radio Club, PO Box 524, Bemidji MN 56601; (218)-751-7502.

COCHISE COUNTY AZ
MAY 4–5

The Cochise Amateur Radio Association (CARA) invites all amateurs to participate in the dedication of the new CARA Training Facility and Range. The inaugural event for the complex will be a hamfest on May 4–5, 1985. A flea market is planned and tailgaters are welcome. The new facility is located 5 miles east of Sierra Vista AZ on Moson Road, off of Highway 90 East. For more information, contact the Cochise Amateur Radio Association, PO Box 1855, Sierra Vista AZ 85636, Attn: KB7HB.

GREENVILLE SC
MAY 4–5

The Blue Ridge Amateur Radio Society will sponsor the 46th annual Greenville Hamfest and Electronics Flea Market on Saturday, May 4, 1985, from 8:00 am to 5:00 pm, and Sunday, May 5, 1985, from 8:00 am to 3:00 pm, at the American Legion Fairgrounds, Greenville SC. Admission is $3.00 in advance and $4.00 at the gate. There will be licensing exams, a Wouff Hong ceremony, the South Carolina ARRL State Convention, 25,000 square feet of dealer displays, an indoor/outdoor flea market, a Saturday-night banquet, camping, and more. For advance tickets or for VEC exam information, write Mrs. Sue Chism N4ENX, PO Box 6751, Greenville SC 29606. For more information, contact Mr. Rancy Rice WD4ADK, 1401 W. Parker Road, Greenville SC 29611.

ROSEVILLE CA
MAY 5

The 13th annual Sacramento Valley Amateur Radio Hamswap will be held on Sunday, May 5, 1985, from 9:00 am to 3:00 pm, at the Placer County Fairgrounds, Roseville CA. Swap tables will be available. There will be food and free parking. Talk-in on 145.190 and 224.780 (K6IS repeaters). For ticket and table information, contact Carl Schultz KA6KWB, 2942 Gwendolyn Way, Rancho Cordova CA 95670; (916)-366-9111.

SANDWICH IL
MAY 5

The Kishwaukee Amateur Radio Club will hold its annual hamfest on Sunday, May 5, 1985, at the DeKalb County Fairgrounds, on Suydam Road just north of Route 34, between Routes 23 and 47. Admission is $2.00 in advance and $3.00 at the gate. Inside display tables are $5.00 each. All parking is free and there will be outside areas for tailgating. Overnight camping will be available (no hookups). Food will also be available. Talk-in on 146.94 and 146.13/.73. For more information or for tickets, write to KARC, Box 334, Sycamore IL 60178.

WEST SPRINGFIELD MA
MAY 5

The Hampden County Radio Association will hold a flea market on Sunday, May 5, 1985, rain or shine, from 9:00 am to 3:00 pm, at the Elks Lodge, Morgan Road, West Springfield MA (Morgan Road is approximately one-half mile south of the Massachusetts Turnpike on Route 5. Turn right onto Morgan Road at Abdows Restaurant and drive three-quarters of a mile to the Elks Lodge). Admission is $1.00 and tables are $3.00 each. Dealers may display from vehicles for $3.00 per vehicle. Refreshments will be available.

BATON ROUGE LA
MAY 11–12

The Baton Rouge Amateur Radio Club will hold its annual hamfest on Saturday and Sunday, May 11–12, 1985, from 8:30 am to 5:00 pm on Saturday, and from 8:30 am to 2:00 pm on Sunday, at the campus of Catholic High School, Baton Rouge LA. Admission is free. Featured will be a swapfest, forums, and new-equipment dealers. Talk-in on 146.79 –. There will be VE exams (through Extra class) from 9:00 am to 12:00 noon on both days. There is a 30-day advance registration deadline for the exams. Send an SASE, Form 610, and a check for $4.00 payable to ARRL/VEC to George Perry W5LVX, 17424 Lady Constance, Greenwell Springs LA 70739. For further information, send an SASE to Rick Pourciau N5HHF, 879 Castle Kirk Drive, Baton Rouge LA 70806.

ARMED FORCES DAY
MAY 18

The 36th annual Armed Forces Day will be held on Saturday, May 18, 1985, from 1400 to 2200 UTC. ARS W4ODR, located at Naval Air Station Memphis, Millington TN, will be operated by active-duty, reserve, and retired sailors and Marines. Plans call for SSB operation on 7.230, 14.280, and 21.370 MHz (±10 kHz). CW frequencies will be 21.145 and 28.145 MHz. 2-meter operation will be on 146.52 simplex. A special red, white, and blue certificate will be available to anyone who works W4ODR. No SASE is required. Calls not in the *Callbook* should QSL to: Military Club Station W4ODR, PO Box 54278, Naval Air Station Memphis, Millington TN 38054.

WIA 75TH ANNIVERSARY

The Wireless Institute of Australia, the world's first radio society, will celebrate its 75th anniversary during 1985. The WIA 75 Award will be available during the period from March 1, 1985, to December 31, 1985. To qualify, amateurs (and SWLs) need to contact (log) 75 members of the WIA. A contact will be valid only if the WIA member's individual membership number is logged. No more than 30 WIA members may be logged in any one callsign area. Send a log extract of the 75 members contacted and $2.00 (Australian) to WIA 75 Award Manager, Wireless Institute of Australia, 412 Brunswick Street, Fitzroy 3065, Victoria, Australia.

SATELLITES

USING THE AO-10 APOGEE PREDICTIONS

Apogee predictions for the month of April are provided for three sections of the United States: Washington DC at 39N 77W, Kansas at 39N 95W, and California at 38N 122W. Times are in UTC and apogee in this case is mean anomaly 128 rounded to the nearest whole hour. Use the chart as a guide in aiming your antenna, then fine-tune the azimuth and elevation values to peak the satellite's beacon signal. If you require more accurate orbital predictions, contact AMSAT at PO Box 27, Washington DC 20044.

AMSAT-OSCAR 10 APOGEE PREDICTIONS
APRIL 1985

			WASH		KANSAS		CALIF	
ORBIT	DAY	TIME	AZ	EL	AZ	EL	AZ	EL
1684	1	1200	136	36	118	24	98	4
1686	2	1200	133	31	116	18		
1688	3	1100	121	24	107	11		
1690	4	1000	111	16	98	3		
1691	4	2200					260	3
1692	5	1000	109	11				
1693	5	2100					253	13
1694	6	0900	101	3				
1695	6	2100			265	0	247	15
1697	7	2000			259	3	239	24
1698	8	1900	264	0	252	13	229	33
1701	9	1900	258	1	246	14	221	33
1703	10	1800	252	10	237	24	208	40
1705	11	1700	244	20	227	32	192	45
1707	12	1700	237	21	220	32	184	42
1709	13	1600	228	30	206	39	166	43
1711	14	1500	215	37	190	43	149	40
1713	15	1400	201	43	172	45	135	35
1715	16	1400	192	41	166	41	132	29
1717	17	1300	175	43	149	38	120	22
1719	18	1200	158	42	135	33	110	15
1721	19	1200	152	37	132	28	109	9
1723	20	1100	138	33	120	21	100	1
1725	21	1000	125	27	110	13		
1727	22	1000	123	21	109	8		
1728	22	2100					262	0
1729	23	0900	113	13				
1730	23	2100					257	1
1731	24	0800	104	6				
1732	24	2000					250	11
1733	25	0800	103	0				
1734	25	1900			261	0	242	20
1736	26	1900			255	1	236	22
1738	27	1800			248	11	226	30
1740	28	1700	254	7	241	20	213	37
1742	29	1700	248	8	234	21	205	37
1744	30	1600	241	17	224	29	190	41

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HAM HELP

We are happy to provide Ham Help listings free, on a space-available basis. We are not happy when we have to take time from other duties to decipher cryptic notes scrawled illegibly on dog-eared postcards and odd-sized scraps of paper. Please type or print your request (neatly!), double spaced, on an 8½" × 11" sheet of paper and use upper- and lowercase letters where appropriate. Also, please make a "1" look like a "1," not an "l," which could be an "el" or an "eye." and so on. Hard as it may be to believe, we are not familiar with every piece of equipment manufactured on Earth for the last 50 years! Thanks for your cooperation.

I need the following items for a Kenwood TS-520: CW filter, frequency counter, external speaker, and external vfo. I also need a book for a Tempo One.

Tony E. Byrum
320 N. Marion
Ottumwa IA 52501

I would like a copy or reprint of the June, 1983, *Ham Radio* article on using the XR-2211 and XR-2206 in a TRS-80 CoCo TTY interface. I will be happy to pay for copies and postage.

Peter St. Arnaud
PO Box 8066
Lowell MA 01853

I need a copy of the schematic and owner's manual for a Hickock model 770A oscilloscope. I will gladly pay postage and copying costs.

James L. Monk W8JJL
2207 Madison Ave.
Norfolk NE 68701

I need a plug-in relay, Allied control number T154 CCC-CCC, 115 V dc, 9000 Ohms, contacts rated for 2 A at 29 V dc. It has 20 flat pins. This is for a National NCX-3.

Joe Karr KA5RKD
Route 1 Box 579
Lakeview AR 72642

I need to know the exact address and zip code of Precision Apparatus Co., Brooklyn NY.

Dick Haskin W6KEC
149 Mauna Loa Dr.
Monrovia CA 91016

I need a manual for the Collins R-390A receiver. I especially need the alignment instructions. I would also like copies of any improvements, modifications, etc., for this receiver. I would be glad to pay for copying charges and postage.

Robert L. Wood WA7DNN
PO Box 9474
Dededo, Guam 96912

I desperately need a schematic for a Gonset GSB-101 model 3262 linear amplifier. I will gladly pay copying costs and postage for any help.

Stephen Rehberg N6KZU
322 E. Mayfair Ave.
Stockton CA 95207

Please: Where can I beg, borrow, steal, or buy a 10 to 1 geared ratio drive with 1/4-inch shafts?

Russell L. Lawson K1MOU
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2.1 kHz 8 pole xtal filter for the R-2000 . . . . . $139.00
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BP4 A-8: $79 BP3 A-8: $64 (8 pin conn.)
BP4 A-4: $73 BP3 A-4: $57 (4 pin conn.)
BP4 B : $65 BP3B : $49 (box & cable but no conn.)
BP4 C : $45, BP3C : $29 (assembled & tested board, no box, no conn.)

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URM-26 SIGNAL GENERATOR 4 MHZ to 405 MHZ CALIBRATED OUTPUT 0 TO 2 V, MODULATION 400/1000 HZ, CALIBRATED OUTPUT ATTENUATOR. SMALL COMPACT SIZE.....245.00
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W2NSD/1
NEVER SAY DIE

editorial by Wayne Green

from page 4

JANUARY HAM CONFERENCE

The Ninth Annual Ham Conference met in Winter Park, Colorado, this January. In addition to discussions of potential solutions to the loss of high-tech career people which the fading away of amateur radio as a hobby has caused, there were demonstrations of some of the newest in microelectronics and ham gear.

The most impressive new piece of ham gear for me was the tiny new Kenwood HT. Incredible. And yet the tiny thing worked just fine when substituted for my now huge old 2400 Kenwood HT.

We gave the HTs a good workout, using them to keep in touch as we skied the whole range of trails at Winter Park, which is a good-sized ski area. For that application a lapel mike/speaker might have helped—I'll have to see if Kenwood has one available yet. Still, even with the HT in my parka pocket I had no problem hearing everyone clearly and talking with them just by squeezing my parka in the right place. It sure made people jump when I talked into my coat—and got answers.

FUN!

John Edwards KI2U
PO Box 73
Middle Village NY 11379

MEN WITH DREAMS

I don't know about you, but I just live for stories like this: According to Associated Press writer Norman Black, a gentleman by the name of Stanley J. Kaplan has been trying for many months to start a common-carrier service that would enable anyone to send brief radio messages "to the sun, the moon, any of the planets in our solar system, or any designated star outside the solar system."

Black writes, "For a $5.00 fee, Kaplan's Teleplanet Services, Inc., of Sudbury, Massachusetts, is prepared to help people 'reach out and break out of their earth-bound existence.' He says the publicity about his plans to transmit 'Space-Shot' messages has already produced a logjam of 175 orders."

Because Kaplan intends to transmit "binary digitized radio messages," he needs FCC approval, and "the FCC just doesn't seem to see this the way I do," Kaplan says. "It's not the average communications that they deal with. It's a dimension, really, that their rules aren't equipped for and I think they're afraid."

Early last September, the FCC announced it had denied Kaplan's request for "Special Temporary Authority to operate a common-carrier one-way paging station at Sudbury for the purpose of offering specialized extraterrestrial communications service to the public," adding that Teleplanet "has not demonstrated that there are extraordinary circumstances requiring temporary operations in the public interest..."

The FCC says it has reclassified the proposal as an application for development of Kaplan's idea, but, "I'm really pessimistic, quite frankly, that they're serious about letting it get off the ground," says Kaplan, who operates a company known as On-Page Enterprises, publishing trade newsletters for the telecommunications field.

Mr. Kaplan sounds like the sort of man who enjoys reading "Fun!," doesn't he? Anyway, who could ask for a better introduction to a column about "Men With Dreams."

ELEMENT 1
MULTIPLE CHOICE

1) One man with a dream was Stew Perry W1BB. His goal, which he achieved, was to:
 1) Work 100 countries on 160 meters
 2) Fly a radio-controlled airplane
 3) Work the USSR on 2 meters
 4) Accompany a DXpedition to XZ-land

2) Tim Chen BV2A/BV2B, currently well-known to DXers, was:
 1) The first winner of the ARRL's Worked All Continents Award
 2) The first licensed ham on Taiwan
 3) The first ham to operate from an airplane
 4) The first ham to operate from Kure Island

3) Father Moran 9N1MM is the only licensed ham in:
 1) Tibet
 2) China
 3) Franistan
 4) Nepal

4) Bill Smith W3GKP and Ross Bateman W4AO were the first hams to:
 1) Work Europe on 6 meters
 2) Bounce a radio signal off the moon
 3) Transmit slow-scan TV
 4) Jam a repeater

5) While certainly not a "man" with a dream, Ethel Smith W7FWB did contribute something important to ham radio. She founded:
 1) The Brass Pounders Award
 2) The Young Ladies Radio League
 3) The Quarter Century Wireless Association
 4) The Dayton Hamvention

ELEMENT 2
TRUE-FALSE

	True	False
1) Tom Christian VR6TC is the only licensed ham on Bermuda.	____	____
2) The original cubical quad antenna was designed for Ecuador's HCJB.	____	____
3) Don Norgaard W2KUJ is regarded as the "father" of the phasing method of generating SSB signals.	____	____
4) Owen Garriott W5LFL was the first ham to operate from space.	____	____
5) Stan Wright WA2DCS was the first ham to hear a "G" station on 6 meters.	____	____
6) Kenneth B. Warner W1EH was the first career employee of the ARRL.	____	____
7) 1AAW was the first US ham station to be heard in Europe.	____	____
8) The first amateur, two-way communications satellite was OSCAR 1.	____	____
9) At one time the ARRL was based in New York City.	____	____
10) W1AWW was the first VHF repeater.	____	____

ELEMENT 3
FILL IN THE BLANK

1) Horace Martin invented the _____.
2) _____ was the first Soviet amateur space satellite.
3) The first official ARRL station was _____.
4) Guglielmo Marconi was assisted in his first radio experiments by his brother, _____ Marconi.

THE ANSWERS

Element 1:
1—1 He was awarded 160-meter DXCC No. 1.
2—2 He uses BV2A on CW, BV2B on phone.
3—4 To the gratitude of DXers everywhere.
4—2 Project Moonbeam they called it in 1953.
5—2 In July, 1939.

Element 2:
1—False Try Pitcairn Island.
2—True Easy to build but hard to maintain.
3—True A helpful contribution to the hobby.
4—True An obvious question, but we couldn't leave this important "first" out of the column.
5—False British hams do not have access to 6 meters.
6—True The first of many to find a comfortable niche in the Hartford, Connecticut, area.
7—True And he was a bootleg operator.
8—False OSCAR III. OSCARs I and II were little more than space beacons.
9—True From 1917 to 1919.
10—True On 5 meters in 1932.

Element 3:
1—Vibroplex semiautomatic keyer ("bug").
2—Radio Sputnik 1 (RS1), in 1978.
3—W1MK.
4—Alfonso.

SCORING

Element 1:
Seven points for each correct answer.
Element 2:
Three points for each correct answer.
Element 3:
Eight points for each correct answer.

How did you do?
1–20 points—Blank mind
21–40 points—Blissful sleeper
41–60 points—Daydreamer
61–80 points—Man with a vision
81–100+ points—Dreams are made of this!

MAILBOX

Thanks to WØKXP/9 and N6DSA for noticing the error in Element 1, Question 2 of September, 1984's "Fun!" The official Conelrad frequencies were 640 and 1240 kHz, not 540 and 880 kHz, as my answer indicated. And no, the radio in my '62 Chevy isn't wrong, although I'll have to replace that burned-out dial lamp.

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REVIEW

THE TU-1200 VHF/UHF RTTY INTERFACE

Of all the modes that amateurs operate, the one which has seen one of the most dramatic usage increases in recent years is RTTY (radioteletype). This upsurge in the popularity of RTTY can be correlated directly with advancements in both solid-state technology and the microcomputer industry. Many of the early microcomputer experimenters were also amateur-radio operators, so micros were in the ham shack before the microcomputer industry had even begun to explode.

Hams were quick to realize that the microcomputer, with its many interfacing capabilities, was ideally suited for use in RTTY. By replacing mechanical gears and reams of paper with integrated circuits and video monitors, RTTY was able to migrate out of the experimenter's basement and into the casual ham's operating station. Soon, radio magazines began to carry many advertisements for various interfaces that allowed the microcomputer and ham-radio transceiver to work together. It was these interfaces and the low-cost microcomputer that led to the increase in the popularity of RTTY.

J. A. Fiesher Co. is one of the early manufacturers of computer/RTTY interfaces; in fact, their TU-170 has become a standard interface for many hams. Their latest RTTY interface, the TU-1200, is designed specifically for VHF and UHF operating. It is available in both kit and wired form, and I recently assembled and operated the kit version along with its wired counterpart.

Theory

The TU-1200 connects between a transceiver and an RS-232 or TTL-compatible terminal. In the receive mode, it detects the mark and space frequencies in the received audio. The mark and space frequencies are converted to digital signals which are outputted to the terminal using either RS-232 or TTL standards (determined by the terminal type). Once in the terminal, usually a microcomputer running terminal-emulation software, the digital signals are decoded according to the format being used (i.e., ASCII, Baudot). The terminal then sends the decoded characters to a monitor or printer, depending on how the system is configured.

In the transmit mode, the TU receives digital signals from the terminal and converts them to mark and space audio signals which are sent as AFSK (audio frequency shift keying) to the transmitter. Either way, the terminal unit must deal with digital signals, audio signals, and a conversion process.

Specifications

The TU-1200 measures 5-1/8 inches wide by 1-3/4 inches high by 6 inches long. There are three push-button switches and three LEDs on the front panel. They are, from left to right: Power, Send, and Normal/Reverse. (See Photo A.) The LEDs indicate power on, sending, and receive data available (RDA). The Power switch is used to turn the TU on, the Send switch is used to put the TU into the transmit mode, and the Normal/Reverse switch is used to invert the mark and space frequencies. Located on the back panel are a DB-25 female connector, a ground connector, and the power cord leading to the included 12-volt wall transformer.

The front panel, back panel, and bottom are dark beige and the top and sides are gray. The unit is aesthetically appealing and fits in nicely with the rest of the station.

As mentioned before, the TU-1200 is designed to operate on VHF and UHF frequencies. Because of this, the design and specifications differ from those of terminal units used on the HF bands. The TU-1200 is compatible with Bell 202 tones; its mark signal is low (1200 Hz) and the space is high (2200 Hz). Also, the unit incorporates a phase-locked-loop demodulator.

A PLL demodulator works by utilizing a phase detector along with a voltage-controlled oscillator (vco) in a feedback circuit. A dc feedback voltage is generated proportional to the difference in frequency between the received audio and the vco. This dc voltage will change as needed to adjust the vco to the same frequency as that which was received. Therefore, the dc voltage will vary as the input audio frequency alternates between mark and space conditions. This varying dc voltage is then filtered and amplified to produce the required mark and space signals.

There are several disadvantages to using a PLL demodulator. One is that they tend to lock onto the strongest signal in their lock range, often ignoring any weaker stations that you might be trying to copy. Another disadvantage is that a PLL has no variable tuning indicator, so it must be tuned by ear in conjunction with a single LED which lights when a signal is tuned in. However, these disadvantages are not important on the VHF and UHF bands because of the lack of interference and the absence of crowded conditions. In fact, the PLL works very well on the VHF and UHF bands.

Another consideration that the TU-1200 takes into account is the high baud rates that the VHF and UHF bands permit. The TU-1200 is designed to send and receive signals at up to 1200 baud while most TUs can go up only to 300 baud. To permit the higher baud rate, the TU-1200 uses Bell 202 tones in which the mark and space frequencies differ by 1000 Hz while the standard shift for the HF bands is 170 Hz.

The TU-1200 has been designed very well to take advantage of the opportunities available to amateurs on the VHF and UHF bands. However, because of its design it is limited to the VHF and UHF bands and will not work well on the HF bands.

As mentioned before, I assembled the kit version of the TU-1200. The unit arrived in excellent condition and a quick inspection of the parts revealed that everything was in order except for the absence of one nut, for which a replacement was easily found. The parts were separated by type and were very easy to account for. The ICs were shipped in a static-proof pouch, the resistors and other individual components were neatly sorted into manila bags, and the case was carefully wrapped in paper.

Before starting the actual construction, I glanced through the manual and found several changes noted on the included correction sheet. Several paragraphs had been rewritten and a few part values had been changed. One change is related to the printed circuit board included with the kit. (The same change applies to the board in the wired version I tested.) Because of a PC-board layout error, one end of a feedback resistor is connected to the wrong op amp of a dual-op-amp IC.

This error causes problems with the op amps, which are used to provide normal and reverse mark and space signals. However, the error is easily corrected by running a jumper wire on the PC board.

The unit took me one evening to assemble. The assembly went smoothly and no problems were encountered. After the assembly and initial testing, all outlined quite well in the manual, came the calibration of the mark and space frequencies. I used a frequency counter with a one-Hertz resolution for the calibration. (The wired version comes pre-adjusted and no calibration is required.)

Once the calibration was finished and the board was mounted in the case, the completed kit and the wired version were ready to be connected between a terminal and transceiver. However, because of the wide variety of computers and radios, the interfacing cables are not included with the TUs. A 25-pin male connector with hood is provided to get you started. Therefore, the next step in integrating the TU into the station was wiring the interface cables.

Photo A. The TU-1200 VHF/UHF RTTY interface from Fiesher.

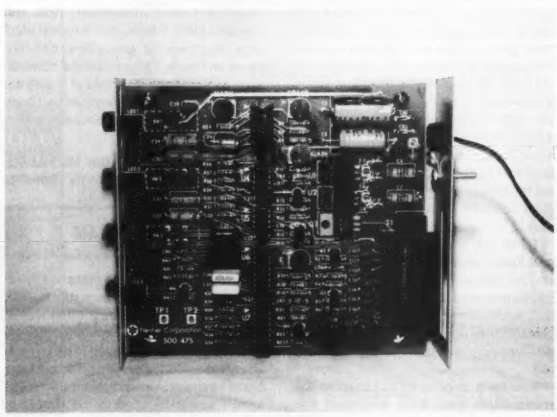

Photo B. The completed printed circuit board of the kit version.

Interfacing

Before starting any kind of wiring, consult the terminal/computer and/or software manuals, the transceiver manual, and the TU-1200 manual. The TU-1200 can accept and send both RS-232 and TTL-compatible signals through the DB-25 female connector located on the back of the unit. Find out which one the terminal/computer will accept and then consult the manuals for the proper wiring.

The connection of the transceiver requires two cables, one connecting to the transmitter's microphone jack and the other to the receiver's audio output. The TU can be used to operate the transmitter PTT if the current/voltage restrictions are met. Otherwise, an external relay is required to take advantage of the PTT. The audio output can come from the phone jack or the external speaker jack on the receiver. However, there is no provision for monitoring the received signal from the TU itself, as there is no external speaker jack.

The TU is capable of communicating using Baudot as well as ASCII at speeds of up to 1200 baud. The RTTY software should be capable of utilizing all these codes and speeds if full use of the TU's features is desired.

I wired the kit version of the TU-1200 to be used with an IC-271A two-meter transceiver and Kantronics Hamsoft for the TRS-80 Color Computer™. The Hamsoft program can operate only at 110 and 300 baud using ASCII, so I was not able to use the high-speed capability of the TU-1200. The assembled TU was wired for use with a Radio Shack TRS-80 Model 100 portable computer and an IC-02AT handie-talkie.

Operating

The most difficult part of the evaluation was finding a way to test the TU under actual two-way operating conditions. I was not able to locate a local amateur capable of operating RTTY using the Bell 202 standard. Because of this, I tested two-way operation of the TU by transmitting from the TRS-80C to the TRS-80 Model 100 under various conditions.

The TU acts very much like a regular telephone computer modem in half duplex, so I connected it to the RS-232 port of the Model 100 and used the Model 100's built-in telecommunications program. Because of this, however, I tested the unit only using ASCII code. A test message consisting of letters, numbers, and other symbols was stored in the TRS-80C for use during each transmission.

For the first test, I configured the two systems for simplex operation at 300-baud ASCII. Immediately after typing the transmit command on the TRS-80C, the Send LED on the TU-1200 lit, the PTT on the IC-271A tripped, and the mark and space tones could be heard rapidly alternating on the monitor speaker. Simultaneously, the RDA LED on the other TU-1200 lit and the Model 100's LCD screen displayed the test message as it was received. A comparison of the received text with that transmitted revealed that no errors had occurred during transmission or reception.

Next, I changed the speed to 110 baud and transmitted the message again. The message was received error-free once more. Now that I was sure the TUs and other equipment were operating properly, I tried a transmission over a longer distance. I transmitted through a local repeater at 300 baud and once again received perfect copy.

Throughout all the testing, the TUs worked perfectly and no problems were encountered.

The TU-1200 is a useful addition to any VHF/UHF station. Any application which requires the transmission of large amounts of data quickly and efficiently would benefit from the high-speed digital communications available from this unit. As the many new people in HF RTTY migrate onto RTTY in the VHF/UHF bands, an increase in the use of Bell 202 should occur.

The TU-1200 is a good buy, with the kit version selling for $99.95 and the assembled for $129.95. I found the people at Flesher to be very considerate and helpful, and I thoroughly enjoyed using the TUs. I see a bright future for the TU-1200 as more amateurs look to increase the capability of their RTTY stations on the VHF/UHF bands for use with high-speed satellite communications, computer-controlled mailboxes, RTTY nets, etc. The TU-1200 is another step in the continuing evolution of amateur radio and digital communications.

For more information, contact *Flesher Corp., PO Box 976, Topeka KS 66601; (913)-234-0198.*

Jonathan L. Mayo KR3T
Media PA

HAM DATA PROGRAMS FOR COMMODORE COMPUTERS

Some ham shacks are neat and orderly, but I have a suspicion that many of them are like mine—an unfinished project here, a piece of coax there. Somewhere buried in the rubble is a logbook. You remember—it's one of those things you used to be required by law to keep!

This haphazard approach to ham life is OK, at least until you decide you want to enter a contest or work toward one or more awards. Then it's time to drag out the paper and pen, perhaps a few shoeboxes for the QSLs, and make a commitment to order in your shack.

Computers seem made for people who hate paperwork. Sure, they can generate paper copies if you want, but in the meantime everything is stored in microscopically small electrons that respond only when you ask them to.

There's a multitude of logging programs available for the Commodore computers. One of the best is the Super Log series from Ham Data. There's something here for everyone, whether you own a VIC-20 with only 8K of expansion or a Commodore 64. Of course, the more memory you have available, the more QSO information you can deal with at one time.

The particular package I use is called Super Log IV and is available on disk only. It can be used on the VIC-20 with a minimum of 8K of expansion or on the 64. The features of Super Logs II and III are included.

So what does $23.95 for Super Log IV get you? Starting with a basic log entry, Super Log IV will compile an ongoing Worked All States summary and a complete DXCC summary. Provisions are even included for adding new countries.

Sorting is a task that computers handle well. With Super Log you can read or print your log by band or by date, find all the contacts you've had with people named Jim (a good name!), or any other unique field in the log entry.

Should you find yourself on the pileup end of the contacts, Super Log will print QSL labels for you with all the necessary information for a valid confirmation. All you do is stick them on the cards!

The program is broken into segments. Many of the special features require that the log be saved, the new segment loaded, and the log reentered before continuing. This can be somewhat inconvenient, but it allows greater versatility within the memory limitations of your machine. I want to make it clear, though, that the normal logging program is self-contained and doesn't require this maneuvering.

Regardless of whether you are using a logging program for hams or recipe files for the kitchen, computers are very picky about how things are designated. You cannot, for example, log some entries as being on the 7-MHz band and others as being on 40 meters and expect the program to find them all. Similar care must be taken with state and country designations. This limitation is not peculiar to Super Log; it is a result of computer technology.

If you are looking for some specific numbers, the C-64 version of Super Log IV will handle 525 files at a time. A new version handles 2000 entries per disk, but I haven't had a chance to try that one. On the other end of the scale, a VIC with 8K of expansion can handle 88 files at one time.

Are you mainly a contester? Contest Log is designed to handle both Sweepstakes and Field Day in approved ARRL format. For other contests there is a very versatile Universal Worldwide Log where you define the categories. A dupe checker, a necessity for contesters, is built-in. A twenty-four-hour clock is displayed on the screen at all times. Serial numbers are generated for you, too. I've used this one "under fire" and it does a good job.

Contest Log II has recently been introduced. It gives the 2000-entry-per-disk flexibility of Super Log V. I was happy to break the 1000 mark in Sweepstakes!

The programmer behind Ham Data software is Chip Lohman NN4U. He has taken a lot of time to create a good product. He also listens to feedback from his customers and has incorporated many of the suggestions submitted by them. Ham Data is proud of their customer service, and rightfully so. They are good people to do business with.

Ham Data also sells several other programs. Though not reviewed, Propagation Chart, Antenna Design, and Computer Morse (trainer) are also available.

Now, if you will excuse me, I need to get ready for the VHF contest. Let's see now, there's the two-meter amp—I think the 432 beam is still in the air. Hmmm...where did I put the Super Log disk...I know it's here somewhere!

For more information, contact *Ham Data, 3331 Bybrook Lane, Woodbridge VA 22192.*

Jim Grubbs K9EI
Springfield IL

LETTERS

I'VE GOT IT!

A conversation on 2 meters the other night prompted me to write you. In the past, as I'm sure you remember, you had to demonstrate your sending ability when taking the CW exam. For this you could use the FCC furnished key, or your own. Why not the same option for receiving CW?

You could use a microphone feeding a simple adjustable tone demodulator. This would in turn feed a small computer with a CW program. Of course, you would have to remember an extension cord to plug everything in! It would prove that not only can you copy CW, but that you can work with state-of-the-art equipment.

I do enjoy *73* very much. Keep up the good construction articles!

John T. Winkler WB3QPY
Wellsboro PA
(Howard K3CKB put him up to it.)

FUDDY-DUDDIES

Your editorial in the December, 1984, issue of *73* is right on! Although I may be guilty of some of these things around the edges, it is exactly what I have been preaching on the air.

On the air with many of my longtime friends I make no bones about what is happening. I tell them that it is not the young radio amateurs that are screwing up the bands. Just listen anywhere—all the old fuddy-duddies are the ones with their gain controls and compressors and finals cranked all the way to the right. The old fuddy-duddies are the ones that act as if they never heard of VOX...we call them the "over-to-you gang." The old fuddy-duddies ramble on and on and never think about IDing. If someone tries to modify their bad habits or crummy signals, they are the first to tell you how long they have been licensed or that the receiver is at fault.

Try to talk about design, construction, new ideas, computers, AMTOR, or packet—the fuddy-duddies tell you to move somewhere else. They are the same ones that were united against two-meter repeaters. They now are the ones timing out the repeaters without even giving their call.

Now for a brighter side: Listen to the young hams (yes, there are fewer and fewer). They are the ones that are coming up with state-of-the-art ideas. Where do you find them? On the two-meter repeaters. Very refreshing.

Anyone with an ounce of brains can see where amateur radio is headed. It almost seems too late now. I wish that your editorials would be required reading for every so-called old-timer.

Don Johnson W6AAQ
Esparto CA

DOWN TO EARTH

I loved your article, "Transistors: A Biased Approach" (December, 1984, and January, 1985). Having had a formal electrical engineering education, concentrated on theory, I appreciate the down-to-earth explanations. The rules of thumb are most helpful in starting any design. I hope to see an article or two on simple amplifier design in the future.

Guy Metrocavich
Morris Plains NJ

BATTLE PLAN

I just passed the Novice test and I found my instructor to be unreasonably lenient. I wondered why, and thought that maybe since amateur radio's popularity has declined, my instructor wanted to pass me to enlarge the number of hams. The next day I read your editorial and found that I was right. I was introduced to *the* cancer of amateur radio. There aren't enough newcomers, and therefore you (now I can say we) are at the mercy of the FCC—which needs our valuable radio space. Well, the work is cut out for us. New members. The FCC will not take away our radio space if we grow in numbers—or at least that is the last hope. I hate to say *last* hope, but that is the way you old-timers are thinking.

Yes, I am 17 years old and Morse code is the main reason I got interested in radio. If I want to use phone, I can pick up the telephone and call Uncle Larry in Connecticut. I am so attracted to Morse because when I call CQ and I get a reply from W1XXXX, I say "wow, I'm talking to someone way up in the northeast." I feel that excitement every time I call CQ.

You know how I got started? I saw dusty equipment in our high school in a small room. The electronics teacher is a Novice and helped me out and here I am.

So this is the battle plan—Publicity. I never knew hams were still around until the teacher told me!

Publicity and the numbers of people it can create will save us from the FCC. Yes, I am going to do my part at my school to recruit my share. How about you?

Jon Sinclair
Athens OH

MASS. CLASSES

The 19-79 Amateur Radio Association will sponsor evening classes for those interested in obtaining a Novice-, Technician-, or General-class license, beginning on March 19, 1985, at Chelsea High School, Chelsea, Massachusetts. The

cost will be minimal—class materials only. For more information, contact the 19-79 Amateur Radio Association, PO Box 171, Chelsea MA 02150. Please enclose your phone number.

19-79 ARA
Chelsea MA

SAY WHAT?

You asked for one reason, one convincing reason why CW is the most efficient use of our crowded radio spectrum.

To convince high schoolers, simply don't tell them about phone until after they're Novices—then let the cat out of the bag.

Japan's high-tech boom has cultural roots as well as no-code roots. The suicide rate there is very high.

I want to start a club at our high school. Any ideas?

Donald E. Fresh N9BAM/K9WAR
Lamar CO

Yep, and the teenage suicide rate in the US is one of the highest in the world—probably another area amateur radio could have made a difference.

Your plan for keeping it a secret that Novices aren't allowed to use voice might be difficult to implement. Of course, if we stick to those with an IQ of under 50 we have a chance—but then the prospect of increasing this contingent is dismaying to contemplate. We already have far too many of this group on our bands jamming nets, jamming repeaters, and making our CB bands sound like oases of calm.

Every time I read a letter from some ham worried about the ham bands being made worse—like the CB bands—I know he's a knee-jerk jerk who hasn't listened to either a ham band or CB in years.

If you want to start a ham club in your local high school, I suggest you meet with the principal and point out the benefits to the students. I suggest you plan to have it during school hours so you aren't up against busing, after-school sports, and union overtime requirements for teachers.—Wayne.

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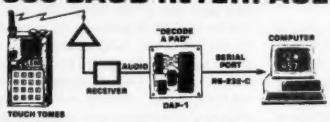

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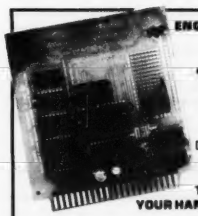

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RTTY LOOP

Marc I. Leavey, M.D. WA3AJR
6 Jenny Lane
Pikesville MD 21208

Somebody asked me the other day, "Just what do you cover in 'RTTY Loop'?" Short of the obvious answer, radioteletype, I paused for a moment. The view I have had of this column, and I hope you have, too, is that we look at the whole spectrum of digital communication over amateur radio. This month, in fact, we shall see two different facets of the picture.

A few months ago, we discussed AMTOR, the RTTY technique which allows error checking on a group of several characters at a time. With automatic requests for retransmission in the case of error, AMTOR can often get a message through in conditions which would prevent the exchange of conventional RTTY information.

Where AMTOR operates on a morsel of a few characters at a time, there is another technique growing in popularity that takes a different approach to error correction. To see what I mean, let's take a short lateral detour, then return to the main drag in a bit.

Those of us in the computer world have all been acquainted with, either directly or by reputation, various bulletin-board services. One of the prime functions of the bulletin board is program and text uploading and downloading, that is, the transfer of material between the user and the host computer. Early attempts at transfer of straight text, much in the way of "conventional" RTTY, often were thwarted by the occasional bit bungled by the communications circuit. Now, when you are sending a message or chewing the rag on RTTY, changing one letter may be little more than an inconvenience. Even if the message said MOVE instead of LOVE, you could probably figure it out. However, when transmitting a program, such an error could cause problems ranging from a Basic program not running to a machine-language program branching into a destructive sequence. Thus, some means of error checking was needed.

The system devised, and commonly in use to this day, was Ward Christensen's XMODEM protocol. In this scheme, the data is sent in groups of 128 bytes. Each block of data is preceded by a block number and followed by a byte called the "checksum," representing a simple method of error correction. If the receiving station does not receive the correct block, in order, or if the checksum it computes does not agree with the one sent, then a repeat is requested. The system has undergone refinements since its inception, but the basic principle remains the same.

An analogous scheme has been devised to move data over radio circuits. Called *packet radio*, this technique organizes the data into discrete packets which have integral addressing and error-checking information, much as the Christensen XMODEM blocks do. Each burst of data, called a "frame," contains:

- an opening flag byte
- an address field containing the address of the originating station, ultimate addressee, and any repeaters required in between
- a control field which identifies the type data contained in the frame
- an information field containing up to 256 bytes of data
- an error-checking field using the Cyclic Redundancy Check
- an ending flag byte

These packets are sent by RTTY techniques and are now in use in many areas at speeds of up to 1200 baud. I have spoken with some local amateurs involved with packet who assure me that techniques exist that, soon enough, will increase the speed by at least a factor of four, if not more!

We will have more on packet radio in future months. It promises to be as revolutionary as it sounds to on-the-air digital communication.

Now, as they would say aboard the *Enterprise*, hard to port and change course to 8504 mark 2, or something like that. Over the years, most regular readers have become acquainted with my love affair with the Motorola 68XX series of microprocessors. My latest love, of course, has been the Tandy TRS-80C Color Computer™. This 6809-based computer has capabilities far beyond similarly-priced microcomputers, only some of which have been yet realized. One of the key differences between the CoCo, as it is known, and larger 6809 systems is the lack of an expansion bus. Well, a new arrival here at WA3AJR has done much to correct that deficit.

The C-C Bus, a product of PBJ, Inc., is an expansion bus for the CoCo that allows up to six boards to be plugged into the CoCo at one time. These boards might be game cartridges, disk controllers, serial or parallel ports, real-time clocks, additional memory, or what have you. It features full buffering of all signal lines, RFI reduction, software selection of any slot, with slot-independent boards, such as ports, available at all times, and a built-in power supply. The availability of a power supply means that the newer CoCo2 will work with older accessories, which require the −12 volts that the CoCo2 does not provide.

To date, I have used the C-C Bus with several other PBJ boards, including their serial interface, parallel interface, real-time clock, and full 80 × 24 terminal board. I have not had enough time yet to tell you about each and every board, but I will, sooner or later. Not only that, but the capabilities of these boards are such that they appear to lend themselves very nicely to the design of RTTY programs.

CoCo owners might do well to drop PBJ a note at PO Box 813, N. Bergen NJ 07047, and tell them that you would like more information on the C-C Bus and other cards you read about in "RTTY Loop."

Remembering that I write this column about two to three months before publication, I can now comment on some of the responses I have been receiving to my questions on RTTY programs in use with various computer systems. Wow! There certainly is a variety. My hope is to accumulate data for a few months, then try to compile what I have collected into some semblance of order for presentation to you. For those who came in late, I am interested in what types of interfacing those of you running computers on RTTY are using, both hardware and software. To keep things straight, I have asked for one computer system a month, but it is not too late for those whose systems have been mentioned before to offer their two cents. To date, in January I asked for users of TI-99/4A computers to drop me a note, in February for Apple II/II+/IIe and clones users' input, and last month for Commodore's VIC-20 and C-64 owners to write. This month, let's hear from all the TRS-80 Z-80 crowd, that is, the TRS-80 Models I, III, and 4. As for the rest of you, hang on and I'll get to you in due time. All I ask is that you drop me a short note, card, or whatever telling me what kind of computer you are using, what kind of hardware and software interfacing you are using, and what you think of it, pro or con.

Another popular item requested in the mail has been the reprints from the past editions of "RTTY Loop." I have put together a bunch of them, with information gleaned from the early days of the column and from other sources. Rather than list them here, drop me a note with a self-addressed, stamped envelope to the address at the head of the column, and I will be happy to send you back a list of what is available.

It is from comments sent in with these requests and the like that I get a feel for what you all are interested in. For example, Gail F. Moulton, Jr. WA6KJD wanted to know more about packet radio. The first half of this month's column is an answer to that request. Let me know what you think, and I shall try to keep this column responsive to your needs; and look for my answer to you in the mail, or here, in the pages of "RTTY Loop."

CONTESTS

Robert Baker WB2GFE
15 Windsor Dr.
Atco NJ 08004

CONNECTICUT QSO PARTY
Starts: 1100 UTC April 13
Ends: 1100 UTC April 14

Sponsored by the Candlewood ARA, the Connecticut QSO Party includes a required rest period from 0500 to 1000 UTC on April 14. Phone and CW are to be considered the same contest.

EXCHANGE:

RS(T), QSO number, ARRL section or CT county.

FREQUENCIES:

Phone—3927, 7250, 14294, 21370, 28540; CW—40 kHz from low end; Novice—3725, 7125, 21125, 28125.

SCORING:

Club station W1QI counts 5 points, Novice QSOs count 2 points, OSCAR QSOs count 3 points, others 1 point each. CT stations multiply QSO points by ARRL sections worked. CT stations may work DX stations for QSO points and one extra multiplier. Others, multiply QSO points by number of CT counties worked.

ENTRIES:

Include an SASE for results and mail entries by May 5 to: CARA, c/o R. Dillon N2EFA, Box 143, Bethel CT 06801.

QRP ARCI SPRING SSB CONTEST
Starts: 1200 UTC April 20
Ends: 2400 UTC April 21

Stations may be worked once per band for QSO points. Participants may operate a maximum of 24 hours during the contest period.

EXCHANGE:

Members—RS, state/province/country, and QRP ARCI membership number; non-

CALENDAR

Apr 13-14	Connecticut QSO Party
Apr 20-21	World Fishing Contest—Vigo '85
Apr 20-21	QRP ARCI Spring SSB Contest
Apr 27-28	Helvetia Contest
May 4-5	Florida QSO Party
May 4-5	Late Spring QRP SSB Activity Weekend
May 28-29	CLARA Ac/Dc Mystery Contest
Jun 8-9	Wordwide South America CW Contest
Jun 8-9	ARRL VHF QSO Party
Jun 22-23	ARRL Field Day
Jul 1	CARF Canada Day Contest
Jul 13-14	IARU Radiosport Championship
Jul 20-22	CQ VHF WPX Contest
Aug 3-4	ARRL UHF Contest
Aug 17-18	New Jersey QSO Party
Aug 17-18	SARTG Worldwide RTTY Contest
Sep 14-15	ARRL VHF QSO Party
Sep 14-16	Washington QSO Party
Sep 28-29	Late Summer QRP CW Activity Weekend
Oct 5-6	ARRL QSO Party—CW
Oct 12-13	Rio CW DX Contest
Oct 12-13	ARRL QSO Party—Phone
Oct 19-20	ARRL Simulated Emergency Test
Nov 2-3	ARRL Sweepstakes—CW
Nov 16-17	ARRL Sweepstakes—Phone
Dec 7-8	ARRL 160-Meter Contest
Dec 14-15	ARRL 10-Meter Contest

NARC RADIO NEWSETTE
December 1984 Volume 5, No. 12

NEWSLETTER OF THE MONTH

Only rarely have we mentioned newsletter logos here. Oddly, newsletters sporting fantastic artwork often fall short in their editorial content, and vice versa. This month's winner, however, makes the grade in both departments. The *NARC Newsette*, chronicle of the Nittany Amateur Radio Club (PA), veritably sparkles.

Richard Sine KB3WN is the editor of this fine publication, assisted by Richard Thompson K3BIE. Richard writes a wonderful column, "Boring Interesting Entertaining," that takes a look at ham activities on all fronts: local, national, and international. The most recent issue features a review of a new ham-oriented book, tips on emergency operation, and plenty of witty filler from the editor. Also present are the usual meeting announcements, items for sale, and paid advertising. In all, a very impressive package.

To enter your club's newsletter in *73*'s Newsletter of the Month Contest, send it to *73* Magazine, 80 Pine Street, Peterborough NH 03458, Attn: Newsletter of the Month.

RESULTS

14th SARTG WORLDWIDE RTTY CONTEST, 1984

World Top Scores, Single Operator

1st	SM6ASD	262,105 points
2nd	DJ6JC	220,320 points
3rd	HB9HK	208,670 points
4th	I4JXE	192,800 points
5th	OZ1CRL	178,620 points

Top USA Scores, Single Operator

9th	KT1N	91,140 points
13th	W8MQK	65,145 points
14th	WA7EGA	47,580 points
17th	W2KHQ	40,635 points
20th	W3KV	32,375 points

Top Multi-Operator

HA5KAG 139,725 points

members—RS, state/province/country, and power output.

SCORING:

Each member QSO counts 5 points regardless of location. Nonmember QSOs with the same continent are 2 points—with different continents, 4 points each.

Count each state, province, and country as a multiplier once per band. USA and Canada do not count as countries, only states and provinces.

Power multipliers are as follows: 4–5 Watts output, ×2; 3–4 Watts output, ×4; 2–3 Watts output, ×6; 1–2 Watts output, ×8; less than 1 Watt output, ×10.

Entries from stations running more than 5 Watts output will count as check logs only. The highest power used for any contact on any band will determine the multiplier to be used for scoring the whole log.

Stations are eligible for the following bonus multipliers: If 100% natural power (solar, wind, etc., with or without storage), ×2. If with storage, storage cells must be charged by the natural power source within 48 hours preceding the start of and/or during the contest. Battery power, ×1.5. No other source of power may be used at any time during the contest to qualify for these multipliers.

Final score is total QSO points times the states/provinces/countries multiplier, times the power multiplier, times the bonus multiplier (if any).

FREQUENCIES:

1810, 3985, 7285, 14285, 21385, 28885, 50385. No 30-meter contacts will be counted.

AWARDS:

Certificates to the highest-scoring station in each state, province, or country with 2 or more entries. Entries automatically considered for annual Triple Crowns of QRP Award. A special MILLIWATT certificate is being sponsored by W0RSP for the highest-scoring station in the less-than-1-Watt category, provided there are two or more entries in that power category.

LOGS AND ENTRIES:

Separate log sheets are suggested for each band for ease of scoring. Send full log data, including full name, address, and bands used, plus work sheet showing details and time(s) off air. No log copies will be returned. All entries desiring results and scores please enclose a large envelope with return postage or two IRCs. It is a condition of entry that the decision of the QRP ARCI Contest Chairman is final in case of dispute. Logs must be received by May 21 to qualify. Send all logs and data to QRP ARCI Contest Chairman, Eugene C. Smith KA5NLY, PO Box 55010, Little Rock AR 72225.

WORLD FISHING CONTEST—VIGO '85

Starts: 1000 UTC April 20
Ends: 1500 UTC April 21

This event was organized in honor of the celebration of the World Fishing Exhibition in Vigo, Spain. The contest will use all bands, 80 through 10 meters—SSB only. Operating classes include (a) single operator, all bands and (b) multi-operator, one transmitter only.

EXCHANGE:

RS report plus CQ zone number.

SCORING:

Count a multiplier for each different DXCC country contacted. The same station may be contacted on different bands but will only count as one multiplier. A contact with station EH1WFE in Vigo is an extra multiplier.

Each contact between stations on different continents is worth 3 points. Contacts between stations on the same continent but different countries are 1 point each. Contacts between stations in the same country are allowed for country-multiplier credit but have zero QSO-point value.

The final score is the result of the total QSO points multiplied by the sum of your country multiplier.

AWARDS:

The first-place entry in category (a), single operator, will receive an all-expenses-paid trip to Vigo, Spain, from the participant's country of origin. The trip will be for a duration of six days in the month of September, 1985, and the winner will visit the World Fishing Exhibition, VIGO '85. He will be considered a special guest of the Exhibition and as such will be presented with a commemorative plaque in honor of his achievements. During the six-day visit to Vigo, various events will be organized in his honor, events such as sightseeing and visits to different places of interest in the area.

The first-place entry in category (b), multi-operator, will receive a trophy for the station and a certificate for each of the operators.

First-place awards will be given for each category in each participating country. In countries or sections where the returns justify, second- and third-place awards will be made. To be eligible for an award, a single-operator station must show a minimum of 10 hours of operation or 100 QSOs minimum.

All certificates and awards will be issued to the licensee of the station used. The World Fishing Contest Committee has the right to increase the prizes without prior notice.

ENTRIES:

Logs must show all times in UTC, all sent and received exchanges, and indicate country multipliers only the first time worked. Logs must be checked for duplicate contacts, correct QSO points, and multipliers. Submitted logs must have duplicate contacts clearly shown.

Each entry must be accompanied by a summary sheet showing all calculations, the entrant's address in block letters, and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed. Use a separate log sheet for each band. Sample log and summary sheets are available upon receipt of a large self-addressed envelope with sufficient postage or IRCs.

All entrants are required to submit a cross-check sheet for each band on which 200 or more QSOs are made. For each duplicate contact that is removed from a log by the contest committee, a penalty of three additional contacts will be subtracted.

Violation of amateur-radio regulations in the country of the contestant, violation of the rules of the contest, excessive duplicate contacts, or unverifiable QSOs or multipliers may be grounds for disqualification. Actions and decisions of the World Fishing Contest Committee are official and final.

All entries must be postmarked no later than May 31 and addressed to World Fishing Contest Committee, PO Box 833, Vigo, Spain.

NEW PRODUCTS

CAGEN CONTEST LOG

CaGen Software has released its new Contest Log program, designed for the Commodore 64 with disk drive and optional printer. The CaGen Contest Log is a rapid-action, machine-language program that eliminates duplicate contest QSOs and prints permanent contest logs and dupe sheets.

Because of its universal design, the program can be used for all contest situations, allowing duplicate checks by callsign alone or by callsign, band, and mode. A single disk file will log and check up to 2500 contacts, completely eliminating the need for paper logs or dupe sheets.

A fully-loaded log of contacts can be dupe-checked using callsign, band, and mode in 2.6 seconds. If the check is only for duplication of callsign, the same number of contacts is checked in less than one second.

The CaGen Contest Log will not allow a duplicate contact to be entered. Instead, it visually notifies the operator and then automatically resets for input of another callsign. Rapid logging is ensured, since the operator enters only callsign and exchange information. Date, time, band, mode, and QSO serial number are automatically entered as each contact is logged. Each entry is permanently written on the disk and power losses will not destroy the log.

A 24-hour clock is continuously displayed and retains its accuracy at all times, since it is not affected by disk read/write activity. The screen is designed to provide a constant display of contest status, showing the number of contacts logged, the time, and the current band and mode of operation. In addition, the QSO rate (contacts/hour) can be displayed at any time. This computation is updated with every log entry and adjusts itself automatically for break times of 30 minutes or more.

Other features include the ability to recall and display any entry by call or by serial number and an update mode which enables the operator to change or add to any log entry whenever necessary.

The print routines will produce a complete contest log and dupe sheets. Dupe sheets can be separated by band and mode or they can be printed as a single

Ultima's new nicad charger.

listing of all contacts, regardless of band or mode.

The CaGen Contest Log provides menu-driven selection of all program choices. While a separate help menu is available for display, the screen always shows all option codes during contest operation.

For more information, contact *CaGen Software, 4821 Rosecroft Street, Virginia Beach VA 23464.*

ESCI PLL DIGITAL SYNTHESIZER

Electronic Systems Consultants, Inc., has announced the availability of a single-board PLL digital frequency synthesizer. The board is designed to be used with a microcomputer as the controller and tunes from 5.0–5.5 MHz in 100-Hz steps. The plug-board construction has edge fingers which match with the well-known STD bus pinouts.

The module is one in a series which will be introduced to allow a complete intelligent HF synthesized station to be constructed by interconnecting the modules.

For more information on this module and future availability of the series, contact *Electronic Systems Consultants, Inc., PO Box 1105, Smithtown NY 11787; (516)-361-8142.*

ULTIMA NICAD BATTERY CHARGER

Ultima Electronics' new low-cost UL-100 battery charger can recharge up to 4 nicad batteries at one time for just pennies a day.

Ultima's UL-100 battery charger is fully automatic and can never overcharge your batteries. It features three separate charging sections which accept 2 or 4 pairs of AAA, AA, C, or D cells, or one pair of cells and one 9-V battery at one time.

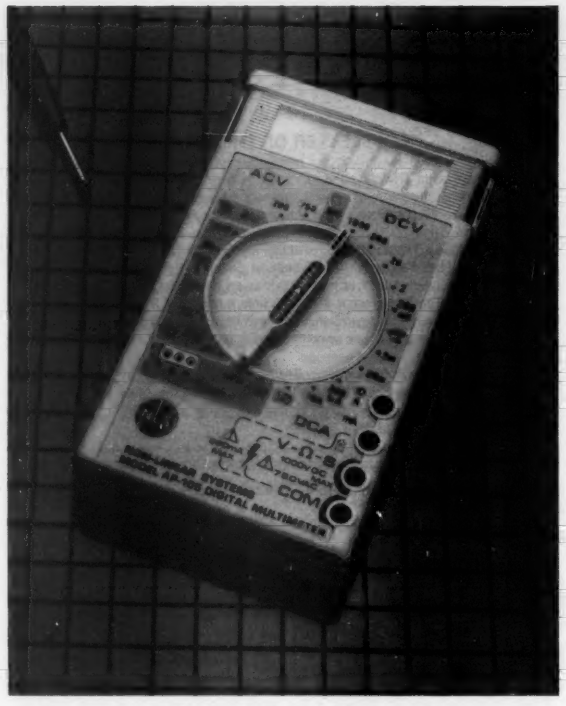
Two convenient LED indicator lights monitor battery pairs in each charging compartment to determine proper charging. A third LED indicates single 9-V battery status. Indicator lights that fail to go on warn the user to check battery polarity for loose contacts.

For further information, contact *Ultima Electronics, Ltd., 21 Central Drive, Farmingdale NY 11735; (516)-752-0144 or (800)-645-9607.*

CETEC VEGA DTMF MODEM

Cetec Vega's new I-733 DTMF/RS-232C modem converts received DTMF messages to ASCII and converts ASCII messages from a computer's RS-232C serial port to DTMF. Incoming and outgoing messages are fully buffered to allow high-speed block data transfer, greatly simplifying applications software.

The I-733 is easily adaptable to a wide variety of applications, including computer-aided dispatch systems, integrated dispatch and status-monitoring systems, message logging to printer, disk, or remote display, remote data entry, and computer-supervised status-monitoring and control systems. With appropriate programming, virtually any computer can be interfaced via the I-733 to an existing or new DTMF system.



Pocket-sized multimeter from Non-Linear Systems.

Demonstration software for using the I-733 with an IBM Personal Computer or an Apple IIe computer is included at no extra cost, either on a 5-1/4-inch diskette or in document form. This software is written in Basic and may be used as the basis for a customized program. Source code is provided.

For additional information, contact *Cetec Vega, 9900 Baldwin Place, El Monte CA 91731.*

NON-LINEAR SYSTEMS POCKET-SIZE MULTIMETER

The AP-105 Digital Multimeter is a low-cost, 3½-digit multimeter that can be used just about anywhere electrical measurement is needed. Besides ac and dc voltage measurement, the AP-105 incorporates seven additional functions including dc current, conductance, resistance, NPN and PNP transistor, diode, and battery test. A single, convenient rotary switch selects on-off power, function, and 23 different ranges.

The AP-105 measures 4.8" × 2.8" × 0.9" and weighs only seven ounces. It also uses a large 0.5" LCD readout with high-contrast numbers. In addition, automatic polarity and overload indication are included. The multimeter is powered by a nine-volt transistor-radio battery with a life of 300 hours. A low-power indicator is also provided.

NLS product information is available by writing *Non-Linear Systems, 533 Stevens Avenue, Solana Beach CA 92075.*

HEATH Z-22 TERMINAL

The new Z-22 Monochrome Terminal is now available from Heath Company, one of the world's largest manufacturers of

Cetec Vega modem converts DTMF to ASCII.

Heath's Z-22 monochrome terminal.

electronic kit products. The assembled and tested Z-22 provides comfortable and easy operation to the user along with built-in flexibility to satisfy both business and personal needs.

The Z-22 Terminal offers user-programming of automatic logons to information services and programmable function keys. Ergonomic features include a low-profile detachable keyboard with a 75-key standard QWERTY-type layout and an 18-key auxiliary keypad. The 12-inch monitor, featuring Zenith's special Chromgoid II phosphor, tilts and rotates.

The CRT displays 25 rows of 80 characters, 24 rows of regular data plus a 25th status row. The terminal displays a 96-character set including upper- and lowercase, numbers, and punctuation. Three sets of graphics are also displayed which include 33 graphics characters, 33 Zenith graphics characters, and 33 foreign characters. The cursor can be set as a blinking or non-blinking character, or blinking or non-blinking underline.

The Z-22 Terminal is just one of many computer products offered by Heath Company in the latest Heathkit Catalog. To receive this colorful catalog free of charge, write *Heath Company, Dept. 150-495, Benton Harbor MI 49022.* In Canada, write *Heath Company, 1020 Islington Avenue, Dept. 3100, Toronto, Ontario M8Z 5Z3.*

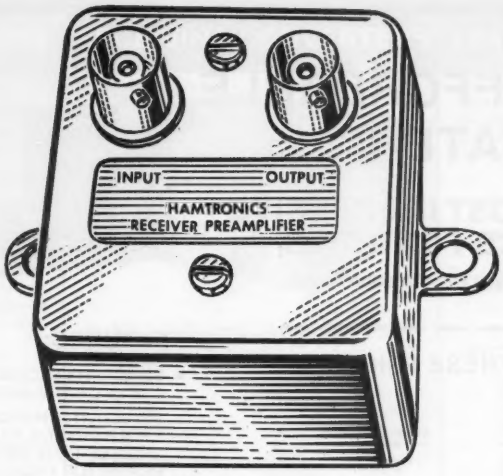
VOCOM AMPLIFIERS

VoCom Products Corporation of Prospect Heights, Illinois, has recently announced a new line of continuous-duty rf amplifiers for fixed-base and repeater operation. The amplifiers complement the company's line of mobile rf amplifiers.

The 19-inch rack-mounted amplifiers are available for 50- and 100-Watt-output applications at UHF and VHF frequencies. The controlled 50-Ohm output impedance and low noise-figure design make these units ideal for congested repeater sites where amplifiers may be required to operate into highly-tuned loads.

Available options include logic-addressable bypass for emergency power saving operation, a high-efficiency ac power supply for 100- or 220-volt operation, and 12-volt emergency backup operation in the event of ac line failure.

An information sheet is available by writing to *VoCom Products Corporation, 65 East Palatine Road, Prospect Heights IL 60070; (800)-USA-MADE.*



The LNG-800 receiver preamp from Hamtronics.

HAMTRONICS® 800-MHZ RECEIVER PREAMP

Hamtronics, Inc., recently announced an 800-960-MHz version of its popular GaAsFET preamp. The LNG-800 preamp features a dual-gate GaAsMESFET with built-in diode protection against static discharge damage. The unit has 11 dB of gain with a 1.5-dB noise figure. It is easy to install, operates on 13.6 V dc, and measures only 2 × 2 × 1½ inches.

For complete information on the LNG preamps, as well as other VHF and UHF equipment such as transmitter and receiver modules, repeater controllers, autopatches, and DTMF controllers, write to *Hamtronics, Inc., 65-F Moul Rd., Hilton NY 14468-9535.*

COMPUTERIZED OSCILLOSCOPE

Rapid Systems has announced their Digital Oscilloscope Peripheral for IBM, Apple, and Commodore personal computers. The peripheral simply plugs into the personal computer, the supplied disk slips in, and the personal computer becomes a digital oscilloscope, ready to go to work.

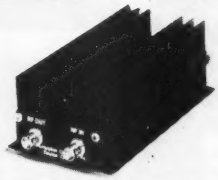
Rapid Systems' new peripheral provides a powerful digital oscilloscope; the personal computer provides intelligent control and analysis. The system is a 4-channel digital oscilloscope, with a 2-MHz sampling rate, 500-kHz analog bandwidth, and diode protection on all inputs. The graphics display is color-enhanced, using up to 138 × 288 pixels for data display (up to four traces) and four lines of text for initial (default) values of the scope's parameters. Menu-driven operation provides keyboard control of gain parameters for channels A, B, C, and D, time base values, number of channels, and trigger mode. Plus, all the post-processing capabilities of the personal computer are available to store and retrieve waveforms from disk, to analyze and process the information, and to compute and word process.

Information on the Rapid Systems Digital Oscilloscope Peripheral is available from *Rapid Systems, 5415 136th Place SE, Bellevue WA 98006; (206)-641-2141.*

CALL LONG DISTANCE ON YOUR HANDHELD

The Model 335A will deliver 35 watts of power using the latest state-of-the-art circuitry. The amplifier will operate SSB or FM and is compatible with most handheld transceivers, including the TR2400, TR2500, IC-2AT, Yaesu, Santec, and Ten-Tec. Only 300 mw input will deliver 5 watts out; 3 watts in will deliver 35 watts out. Maximum input drive level is 5 watts.

Our products are backed by prompt factory service and technical assistance. To become familiar with our other fine products in the amateur radio market, call or write for our free product and small parts catalog.

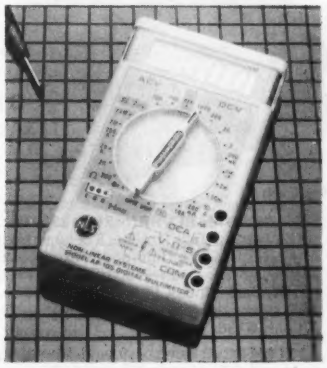


Model 335A
Kit $69.95
Wired & Tested $89.95

VISA

CCI Communication Concepts Inc.
2648 North Aragon Ave.• Dayton, Ohio 45420•(513) 296-1411

AP-105 DIGITAL MULTIMETER



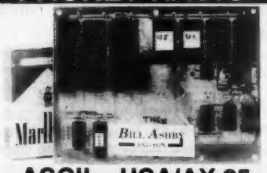
LOW COST 3½ DIGIT LCD

Functions Include: CONDUCTANCE DC VOLTAGE AC VOLTAGE hFE TEST RESISTANCE DC CURRENT DIODE TEST

PRICE: $53.30

NLS NON-LINEAR SYSTEMS
533 STEVENS AVE.
SOLANA BEACH, CA 92075
619/481-3900

PACKET RADIO



ASCII—USA/AX.25 HDLC CONVERTER

USA/AX.25 is the AMRAD approved digital format STANDARD used on amateur packet radio networks.

PAC/NET board only $80.00
Assembled/Tested. No ICs. 90 day warranty

Package of all ICs except 2-2716 EPROMs $80.00

PAC/NET SYSTEM

PAC/NET SYSTEM $240.00
System Tested 4.5 × 6" board complete with all IC s and programmed EPROMs personalized for each purchaser. Requires only single 8-10 volt ½ amp power. 1 year guarantee of hardware/software/AX.25 standard RS232 serial ASCII at any user baud rate.RS232 HDLC for 202 modem used for AFSK or direct to RF equipment for FSK.

Custom Systems Custom Programming
BILL ASHBY AND SON
K2TKN—KA2OEG 201-658-3087
BOX 332 PLUCKEMIN N.J. 07978

THE MOST AFFORDABLE REPEATER

ALSO HAS THE MOST IMPRESSIVE PERFORMANCE FEATURES

(AND GIVES THEM TO YOU AS STANDARD EQUIPMENT!)

JUST LOOK AT THESE PRICES!

Band	Kit	Wired/Tested
10M,6M,2M,220	$680	$880
440	$780	$980

Both kit and wired units are complete with all parts, modules, hardware, and crystals.

CALL OR WRITE FOR COMPLETE DETAILS.

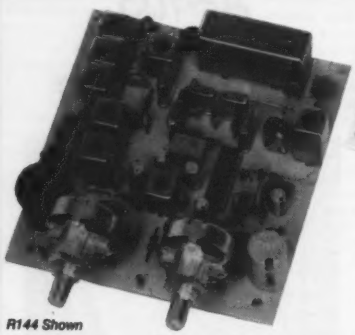
Also available for remote site linking, crossband, and remote base.

FEATURES:

- SENSITIVITY SECOND TO NONE; TYPICALLY 0.15 uV ON VHF, 0.3 uV ON UHF.
- SELECTIVITY THAT CAN'T BE BEAT! BOTH 8 POLE CRYSTAL FILTER & CERAMIC FILTER FOR GREATER THAN 100 dB AT ± 12KHZ. HELICAL RESONATOR FRONT ENDS. SEE R144, R220, AND R451 SPECS IN RECEIVER AD BELOW.
- OTHER GREAT RECEIVER FEATURES: FLUTTER-PROOF SQUELCH, AFC TO COMPENSATE FOR OFF-FREQ TRANSMITTERS, SEPARATE LOCAL SPEAKER AMPLIFIER & CONTROL.
- CLEAN, EASY TUNE TRANSMITTER; UP TO 20 WATTS OUT (UP TO 50W WITH OPTIONAL PA).

HIGH QUALITY MODULES FOR REPEATERS, LINKS, TELEMETRY, ETC.

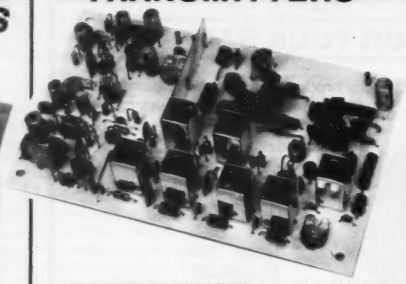
HIGH-PERFORMANCE RECEIVER MODULES



R144 Shown

- **R144/R220 FM RCVRS** for 2M or 220 MHz. 0.15uV sens.; 8 pole xtal filter & ceramic filter in I-f, helical resonator front end for exceptional selectivity, more than −100 dB at ±12 kHz, best available today. Flutter-proof squelch. AFC tracks drifting xmtrs. Xtal oven avail. Kit only $138.
- **R451 FM RCVR** Same but for uhf. Tuned line front end, 0.3 uV sens. Kit only $138.
- **R76 FM RCVR** for 10M, 6M, 2M, 220, or commercial bands. As above, but w/o AFC or hel. res. Kits only $118. Also avail w/4 pole filter, only $98/kit.
- **R110 VHF AM RECEIVER** kit for VHF aircraft band or ham bands. Only $98.
- **R110-259 SPACE SHUTTLE RECEIVER,** kit only $98.

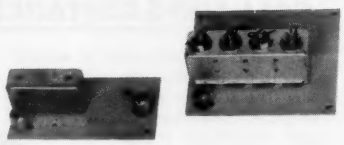
TRANSMITTERS



- **T51 VHF FM EXCITER** for 10M, 6M, 2M, 220 MHz or adjacent bands. 2 Watts continuous, up to 2½ W intermittent. $68/kit.

- **T451 UHF FM EXCITER** 2 to 3 Watts on 450 ham band or adjacent freq. Kit only $78.
- **VHF & UHF LINEAR AMPLIFIERS.** Use on either FM or SSB. Power levels from 10 to 45 Watts to go with exciters & xmtg converters. Several models. Kits from $78.
- **A16 RF TIGHT BOX** Deep drawn alum. case with tight cover and no seams. 7 x 8 x 2 inches. Designed especially for repeaters. $20.

ACCESSORIES



- **HELICAL RESONATOR FILTERS** available separately on pcb w/connectors.

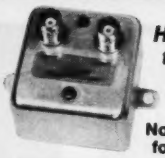
  HRF-144 for 143-150 MHz $38
  HRF-220 for 213-233 MHz $38
  HRF-432 for 420-450 MHz $48

- **COR-2 KIT** With audio mixer, local speaker amplifier, tail & time-out timers. Only $38.
- **COR-3 KIT** as above, but with "courtesy beep". Only $58.
- **CWID KITS** 158 bits, field programmable, clean audio, rugged TTL logic. Kit only $68.
- **DTMF DECODER/CONTROLLER KITS.** Control 2 separate on/off functions with touchtones®, e.g., repeater and autopatch. Use with main or aux. receiver or with Autopatch. Only $90
- **AUTOPATCH KITS.** Provide repeater autopatch, reverse patch, phone line remote control of repeater, secondary control via repeater receiver. Many other features. Only $90. Requires DTMF Module.

- **NEW – SIMPLEX AUTOPATCH** Use with any transceiver. System includes DTMF & Autopatch modules above and new Timing module to provide simplex autopatch and reverse autopatch. Complete patch system only $200/kit. Call or write for details.

hamtronics®

NEW LOW-NOISE PREAMPS RECEIVING CONVERTERS TRANSMIT CONVERTERS



Hamtronics Breaks the Price Barrier!

*

No Need to Pay $80 to $125 for a GaAs FET Preamp.

FEATURES:

- Very Low Noise: 0.7 dB VHF, 0.8 dB UHF
- High Gain: 18 to 28 dB, Depending on Freq.
- Wide Dynamic Range for Overload Resistance
- Latest Dual-gate GaAs FET, Stable Over Wide Range of Conditions
- Rugged, Diode-protected Transistors
- Easy to Tune
- Operates on Standard 12 to 14 Vdc Supply
- Can be Tower Mounted

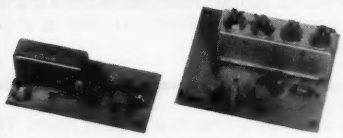
MODEL	TUNES RANGE	PRICE
LNG-28	26-30 MHz	$49
LNG-50	46-56 MHz	$49
LNG-144	137-150 MHz	$49
LNG-220	210-230 MHz	$49
LNG-432	400-470 MHz	$49
LNG-40	30-46 MHz	$64
LNG-160	150-172 MHz	$64

ECONOMY PREAMPS

Our traditional preamps, proven in years of service. Over 20,000 in use throughout the world. Tuneable over narrow range. Specify exact freq. band needed. Gain 16-20 dB. NF = 2 dB or less. VHF units available 27 to 300 MHz. UHF units available 300 to 650 MHz.

- P30K, VHF Kit less case $18
- P30W, VHF Wired/Tested $33
- P432K, UHF Kit less case $21
- P432W, UHF Wired/Tested $36

HELICAL RESONATOR PREAMPS



Our lab has developed a new line of low-noise receiver preamps with helical resonator filters built in. The combination of a low noise amplifier and the sharp selectivity of a 3 or 4 section helical resonator provides increased sensitivity while reducing intermod and cross-band interference in critical applications. See selectivity curves at right. Gain = approx. 12 dB.

Model	Tuning Range	Price
HRA-144	143-150 MHz	$49
HRA-220	213-233 MHz	$49
HRA-432	420-450 MHz	$59
HRA-( )	150-174MHz	$69
HRA-( )	450-470 MHz	$79

Models to cover every practical rf & if range to listen to SSB, FM, ATV, etc. NF = 2 dB or less.

	Antenna Input Range	Receiver Output
VHF MODELS	28-32	144-148
Kit with Case $49	50-52	28-30
Less Case $39	50-54	144-148
Wired $69	144-146	28-30
	145-147	28-30
	144-144.4	27-27.4
	146-148	28-30
	144-148	50-54
	220-222	28-30
	220-224	144-148
	222-226	144-148
	220-224	50-54
	222-224	28-30
UHF MODELS	432-434	28-30
Kit with Case $59	435-437	28-30
Less Case $49	432-436	144-148
Wired $75	432-436	50-54
	439.25	61.25

SCANNER CONVERTERS Copy 72-76, 135-144, 240-270, 400-420, or 806-894 MHz bands on any scanner. Wired/tested Only $88.

SAVE A BUNDLE ON VHF FM TRANSCEIVERS!

FM-5 PC Board Kit – **ONLY $178** complete with controls, heatsink, etc. 10 Watts, 5 Channels, for 2M or 220 MHz.

Cabinet Kit, complete with speaker, knobs, connectors, hardware. Only $60.

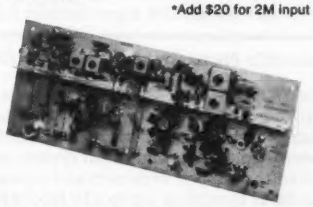
REPEAT OF A SELLOUT!

While supply lasts, get $60 cabinet kit free when you buy an FM-5 Transceiver kit. Where else can you get a complete transceiver for only $178

For SSB, CW, ATV, FM, etc. Why pay big bucks for a multi mode rig for each band? Can be linked with receive converters for transceive. 2 Watts output vhf, 1 Watt uhf.

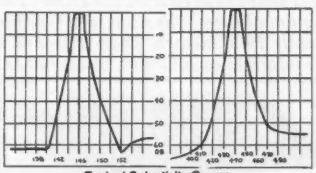
	Exciter Input Range	Antenna Output
For VHF,	28-30	144-146
Model XV2	28-29	145-146
Kit $79	28-30	50-52
Wired $149	27-27.4	144-144.4
(Specify band)	28-30	220-222*
	50-54	220-224
	144-146	50-52
	50-54	144-148
	144-148	28-30
For UHF,	28-30	432-434
Model XV4	28-30	435-437
Kit $99	50-54	432-436
Wired $169	61.25	439.25
	144-148	432-436*

*Add $20 for 2M input



VHF & UHF LINEAR AMPLIFIERS. Use with above. Power levels from 10 to 45 Watts. Several models, kits from $78.

LOOK AT THESE ATTRACTIVE CURVES!



Typical Selectivity Curves of Receivers and Helical Resonators.

IMPORTANT REASONS WHY YOU SHOULD BUY FROM THE VALUE LEADER:

1. *Largest selection of vhf and uhf kits in the world.*
2. *Exceptional quality and low prices due to large volume.*
3. *Fast delivery; most kits shipped same day.*
4. *Complete, professional instruction manuals.*
5. *Prompt factory service available and free phone consultation.*
6. *In business 21 years.*
7. *Sell more repeater modules than all other mfrs. and have for years. Can give quality features for much lower cost.*

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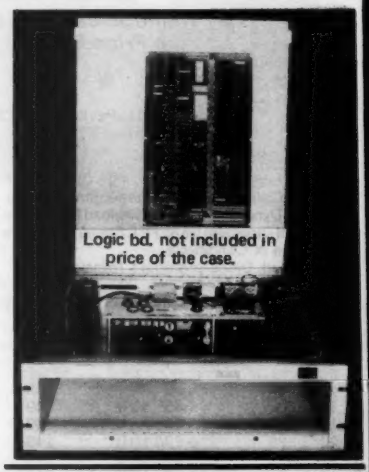
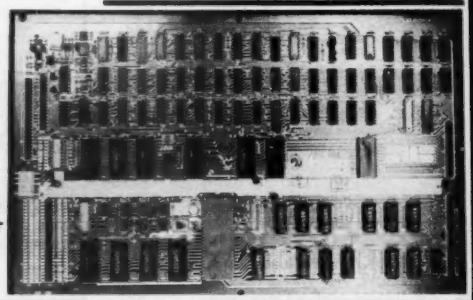
Dual 8" F. D. D. Case by SMS w/ POWER ONE Power Supply & Cooling Fans

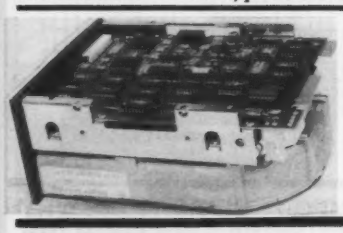
We were very fortunate to find these beautifully designed & constructed rack mount disc drive cases in the surplus field. These cases were made for Scientific Micro Systems for their FT Series of equipment. They are manufactured from heavy guage steel w/ a cast metal designer bezel. They were designed to house 2 8" floppy or hard drives. We offer you the case with the following components & features: hinged cover with restraining cable for simplified servicing of the interior components, 2 muffin fans for assured cool operation, studs for mounting the controller card listed below, and a heavy duty Power One power supply (their model no. CP 281A). The outputs of the power supply are as follows: +5 vdc 11 amps, +24 vdc 3.5 amps, +12 vdc .25 amps, -12 vdc .25 amps, & –5 vdc .25 amps. The input to the power supply is 115/230 vac 50/60 Hz. and is both filtered and fused. This assembly must have originally sold for well over $300.00 each ! Only 25 on hand, so order early or be left out on this super bargain ! Shpg. wt. 38 lb. SPL-479-35 $135.00 each



Scientific Micro Systems IBM 3740 Compatible 8" FDD Controller Card

The SMS FD 0502 8" floppy disc drive controller is a complete preprogrammed controller for single or double density recording on either single or dual headed disc drives. It performs control functions required to transfer data between 1 to 4 drives and a host system, performs all formatting functions required to read and write data and utilizes both IBM single and double density standards to achieve up to 630 Kilobytes of storage per disc surface. Some features are: programmable sector size, 128, 256, 512, or 1024 bytes, jumper selectable drive type, block transfer mode, sector buffer, overlapped head seek, on board General Purpose Host Interface with asynchronous 19 TTL signal lines for eight bit host system and input of only 5 vdc 6 amps. This board provides a direct interface to the following drives: Shugart 800 –2/850, Pertec 511, Memorex 550/552, MFE 751B, Qume Data Trak and similiar drives. These boards were removed from the above cabinets which were in service prior to our reception of them. The manufacturers price on these IBM compatible boards is currently $900.00 each. These boards all appear to be in excellent condition. If more information is needed, please call us. Shpg. wt. 3 lb. SPL 480 $150.00

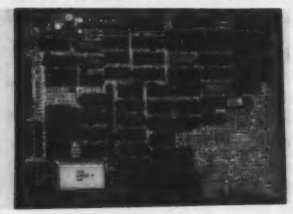




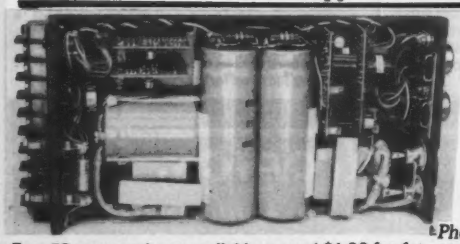
SEAGATE TECHNOLOGY ST 506 5¼" HARD DRIVES

The Seagate Technology ST 506 hard disc drive utilizes proven Winchester teacnology for reliable storage of up to 5 megabytes of formatted data. Some features of this very popular drive are: 5 megabit/second data transfer rate, simple floppy like interface, high speed band actuator & stepper head positioning, requires only +5 & +12 vdc, and same physical size and mounting paramters as a mini floppy drive. This Shugart compatible drive is the same as used on many home personal computers. Each drive is checked out prior to shipment. Comes with data. Only a few on hand, so order early.
Shpg. wt. 8 lb. ST-506 $225.00

5 ¼" HARD DRIVE CONTROLLER CARD



Finally, affordable, intelligent disc drive controllers are available at low, low surplus prices. The OMTI 20C controller boards we offer are unused, late style, surplus from a now defunct system house. OMTI is a division of Scientific Micro Systems. These boards will handle up to (2) 5¼ inch Winchester type hard drives that utilize a standard 34 pin SASI interface. Perfect for using with the above Seagate ST 506 drive, or other hard drives from 5 megabytes of storage on up. The controllers have buffered slew/seek modes, overlapped seeks, auto seek & verify, extensive fault detection, auto head & cylinder switching, full sector buffering, 256/512 bytes/sector, 33 or 18 sectors/track (jumper selectable), programmable disc parameters and much more. The board runs on +5 vdc & +12 vdc.. We supply users manual & pinout data. Guaranteed O. K..
Shpg. wt. 3 lb. OMTI 20 C $150.00 each 2/$275.00 Qty. pricing available.



5 VDC 25 AMP SWITCHING POWER SUPPLY

We just got in a small lot of ruggedly built, lightweight (4 lb.), compact (11" x 5" x 1½"), fully enclosed (cover removed for pic.), regulated, switching, power supplies made by RO Industries. Input of 115/230 vac is attached thru convenient, clearly marked screw terminals. The hefty 5 vdc 25 amp output is via heavy duty, brass lugs with a Red LED status indicator. All appear to be unused and in excellent condition.
Shpg. wt. 6 lb. PS-8 $50.00

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2K28	200.00	4624	310.00	7854	130.00
3-500Z	102.00	4657	84.00	ML7855KAL	125.00
3-1000Z/8164	400.00	4662	100.00	7984	14.95
3B28/866A	9.50	4665	500.00	8072	84.00
3CX400U7/8961	255.00	4687	P.O.R.	8106	5.00
3CX1000A7/8283	526.00	5675	42.00	8117A	225.00
3CX3000F1/8239	567.00	5721	250.00	8121	110.00
3CW30000H7	1700.00	5768	125.00	8122	110.00
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3X3000F1	567.00	5836	232.50	8156	12.00
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4-250A/5D22	98.00	5867A	185.00	8295/PL172	500.00
4-400A/8438	98.00	5868/AX9902	270.00	8458	35.00
4-400B/7527	110.00	5876/A	42.00	8462	130.00
4-400C/6775	110.00	5881/6L6	8.00	8505A	95.00
4-1000A/8166	444.00	5893	60.00	8533W	136.00
4CX250B/7203	54.00	5894/A	54.00	8560/A	75.00
4CX250FG/8621	75.00	5894B/8737	54.00	8560AS	100.00
4CX250K/8245	125.00	5946	395.00	8608	38.00
4CX250R/7580W	90.00	6083/AZ9909	95.00	8624	100.00
4CX300A/8167	170.00	6146/6146A	8.50	8637	70.00
4CX350A/8321	110.00	6146B/8298	10.50	8643	83.00
4CX350F/8322	115.00	6146W/7212	17.95	8647	168.00
4CX350FJ/8904	140.00	6156	110.00	8683	95.00
4CX600J/8809	835.00	6159	13.85	8877	465.00
4CX1000A/8168	242.50*	6159B	23.50	8908	13.00
4CX1000A/8168	485.00	6161	325.00	8950	13.00
4CX1500B/8660	555.00	6280	42.50	8930	137.00
4CX5000A/8170	1100.00	6291	180.00	6L6 Metal	25.00
4CX10000D/8171	1255.00	6293	24.00	6L6GC	5.03
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4CW800F	710.00	6360/A	5.75	6CL6	3.50
4D32	240.00	6399	540.00	6DJ8	2.50
4E27A/5-125B	240.00	6550A	10.00	6DQ5	6.58
4PR60A	200.00	6883B/8032A/8552	10.00	6GF5	5.85
4PR60B	345.00	6897	160.00	6GJ5A	6.20
4PR65A/8187	175.00	6907	79.00	6GK6	6.00
4PR1000A/8189	590.00	6922/6DJ8	5.00	6HB5	6.00
4X150A/7034	60.00	6939	22.00	6HF5	8.73
4X150D/7609	95.00	7094	250.00	6JG6A	6.28
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NOTE P.O.R. = PRICE ON REQUEST

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455KHZ at 3.2KHz wide. May be other models but equivalent. May be used or new. $15.99

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8 pole 2.7KHz wide Upper sideband. Impedence 800ohms 15pf In/800ohms 0pf out. 19.99

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455KHz at Center Frequency of 453.5KC. Carrier Frequency of 455KHz 2.36KC Bandwidth.
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Lower sideband. (ZL) 19.99

CRYSTAL FILTERS

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TEW	FEC-103-2	10.6935MHz	10.00
SDK	SCH-113A	11.2735MHz	10.00
TAMA	TF-31H250	CF 3179.3KHz	19.99
TYCO/CD	001019880	10.7MHz 2pole 15KHz bandwidth	5.00
MOTOROLA	4884863B01	11.7MHz 2pole 15KHz bandwidth	5.00
PTI	5350C	12MHz 2pole 15KHz bandwidth	5.00
PTI	5426C	21.4MHz 2pole 15KHz bandwidth	5.00
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COMTECH	A10300	45MHz 2pole 15KHz bandwidth	6.00
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CERAMIC FILTERS

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	CFM455D	455KHz +-7KHz at 3dB , +-10KHz at 6dB , +-20KHz at 50dB	6.65
	CFR455E	455KHz +-5.5KHz at 3dB , +-8KHz at 6dB , +-16KHz at 60dB	8.00
	CFU455B	455KHz +-2KHz bandwidth +-15KHz at 6dB, +-30KHz at 40dB	2.90
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	CFU455I	455KHz +-1KHz bandwidth +-2KHz at 6dB , +-6KHz at 40dB	2.90
	CFW455D	455KHz +-10KHz at 6dB , +-20KHz at 40dB	2.90
	CFW455H	455KHz +-3KHz at 6dB , +-9KHz at 40dB	2.90
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	SFE10.7MS	10,7MHz 230KHz +-50KHz at 3dB , 570KHz at 20dB	2.50
	SFG10.7MA	10.7MHz	10.00
NIPPON	LF-B4/CFU455I	455KHz +-1KHz	2.90
	LF-B6/CFU455H	455KHz +-1KHz	2.90
	LF-B8	455KHz	2.90
	LF-C18	455KHz	10.00
TOKIN	CF455A/BFU455K	455KHz +-2KHz	5.00
MATSUSHIRA	EFC-L455K	455KHz	7.00

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TYPE	PRICE
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2N1562	25.00
2N1692	25.00
2N2857	1.55
2N2857JAN	4.10
2N2857JANTX	4.50
2N2876	13.50
2N2947	18.35
2N2948	13.00
2N2949	15.50
2N3118	5.00
2N3119	4.00
2N3134	1.15
2N3287	4.90
2N3288	4.40
2N3309	4.85
2N3375	17.10
2N3478	2.13
2N3553	1.55
2N3553JAN	2.90
2N3632	15.50
2N3733	11.00
2N3818	5.00
2N3866	1.30
2N3866JAN	2.20
2N3866JANTX	3.80
2N3866JANTXV	4.70
2N3866AJANTXV	5.30
2N3924	3.35
2N3926	16.10
2N3927	17.25
2N3948	1.75
2N3950	25.00
2N3959	3.85
2N4012	11.00
2N4037	2.00
2N4041	14.00
2N4072	1.80
2N4080	4.53
2N4127	21.00
2N4416	2.25
2N4427	1.25
2N4428	1.85
2N4430	11.80
2N4927	3.90
2N4957	3.45
2N4959	2.30
2N5016	18.40
2N5026	15.00
2N5070	18.40
2N5090	13.80
2N5108	3.45
2N5109	1.70
2N5160	3.45
2N5177	21.62
2N5179	1.04
2N5216	56.00
2N5470	75.00
2N5583	3.45
2N5589	9.77
2N5590	10.92
2N5591	13.80
2N5596	99.00
2N5636	12.00
2N5637	15.50
2N5641	12.42
2N5642	14.03
2N5643	25.50
2N5645	13.80
2N5646	20.70
2N5651	11.05
2N5691	18.00
2N5764	27.00
2N5836	3.45
2N5842	8.45
2N5847	19.90
2N5849	20.00
2N5913	3.25
2N5916	36.00
2N5920	$ 70.00
2N5921	80.00
2N5922	10.00
2N5923	25.00
2N5941	23.00
2N5942	40.00
2N5944	10.35
2N5945	10.00
2N5946	12.00
2N5947	9.20
2N6080	6.00
2N6081	7.00
2N6082	9.00
2N6083	9.50
2N6084	12.00
2N6094	11.00
2N6095	12.00
2N6096	16.10
2N6097	20.70
2N6105	21.00
2N6136	21.85
2N6166	40.24
2N6267	142.00
2N6304	1.50
2N6368	30.00
2N6439	55.31
2N6459	18.00
2N6567	10.06
2N6603	13.50
2N6604	13.50
2N6679	44.00
2N6680	80.00
021-1	15.00
01-80703T4	65.00
35C05	15.00
102-1	28.00
103-1	28.00
103-2	28.00
104P1	18.00
163P1	10.00
181-3	15.00
210-2	10.00
269-1	18.00
281-1	15.00
282-1	30.00
482	7.50
564-1	25.00
698-3	15.00
703-1	15.00
704	4.00
709-2	11.00
711	4.00
733-2	15.00
798-2	25.00
3421	28.00
3683P1	15.00
3992	25.00
4164P1	15.00
4243P1	28.00
4340P3	18.00
4387P1	27.50
7104-1	28.00
7249-2	10.50
7283-1	37.50
7536-1	30.00
7794-1	10.50
7795	15.00
7795-1	15.00
7796-1	24.00
7797-1	36.00
40081 RCA	5.00
40279 RCA	10.00
40280 RCA	4.62
40281 RCA	10.00
40282 RCA	20.00
40290 RCA	2.80
40292 RCA	13.05
40294 RCA	2.50
40341 RCA	21.00
40608 RCA	$ 2.48
40673 RCA	2.50
40894 RCA	1.00
60247 RCA	25.00
61206 RCA	100.00
62800A RCA	60.00
62803 RCA	100.00
430414/3990RCA	50.00
3457159 RCA	20.00
3729685-2 RCA	75.00
3729701-2 RCA	50.00
3753883 RCA	50.00
615467-902	25.00
615467-903	40.00
2SC568	2.50
2SC703	36.00
2SC756A	7.50
2SC781	2.80
2SC1018	1.00
2SC1042	24.00
2SC1070	2.50
2SC1216	2.50
2SC1239	2.50
2SC1251	24.00
2SC1306	2.90
2SC1307	5.50
2SC1424	2.80
2SC1600	5.00
2SC1678	2.00
2SC1729	32.40
2SC1760	1.50
2SC1909	4.00
2SC1945	10.00
2SC1946	40.00
2SC1947	10.00
2SC1970	2.50
2SC1974	4.00
2SC2166	5.50
2SC2237	32.00
2SC2695	47.00
A2X1698	POR
A3-12	14.45
A50-12	24.00
A209	10.00
A283	6.00
A283B	6.00
A1610	19.00
AF102	2.50
AFY12	2.50
AR7115	20.00
AT41435-5	6.35
B2-8Z	10.70
B3-12	10.85
B12-12	15.70
BAL0204125	152.95
BF25-35	56.25
B40-12	19.25
B70-12	55.00
BF272A	2.50
BFQ85	2.50
BFR21	2.50
BFR90	1.00
BFR91	1.65
BFR99	2.50
BFT12	2.50
BFW16A	2.50
BFW17	2.50
BFW92	1.50
BFX44	2.50
BFX48	2.50
BFX65	2.50
BFX84	2.50
BFX85	2.50
BFX86	2.50
BFX89	1.00
BFY11	2.50
BFY18	2.50
BFY19	2.50
BFY39	2.50
BFY90	$ 1.50
BLW60C5	15.00
BLX67	12.25
BLX67C3	12.25
BLX93C3	22.21
BLY87A	7.50
BLY88C3	13.08
BLY89C	13.00
BLY90	45.00
BLY92	13.30
BLY94C	45.00
BLY351	10.00
BLY568C/CF	30.00
C2M70-28R	92.70
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DXL1003P70	22.00
DXL2001P70	19.00
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EFJ4015	12.00
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G65739	25.00
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GM0290A	2.50
HEP76	4.95
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HEPS3003	30.00
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HEPS3006	19.90
HEPS3007	25.00
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HFET2204	112.00
HP35821	38.00
HP35826B	32.00
HP35826E	32.00
HP35831E	30.00
HP35832E	50.00
HP35833E	50.00
HP35859E	75.00
HP35866E	44.00
HXTR2101	44.00
HXTR3101	7.00
HXTR5101	31.00
HXTR6104	68.00
HXTR6105	31.00
HXTR6106	33.00
J310	1.00
JO2000	10.00
JO2001	25.00
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M1131	5.15	MRF464	25.30	NE021350	5.30	SD1009-2	15.00
M1132	7.25	MRF466	18.97	NE13783	61.00	SD1012	10.00
M1134	13.40	MRF472	1.50	NE21889	43.00	SD1012-3	10.00
M9116	29.10	MRF475	3.10	NE57835	5.70	SD1012-5	10.00
M9579	6.00	MRF476	3.16	NE64360ER-A	100.00	SD1013	10.00
M9580	7.95	MRF477	20.00	NE64480 (B)	94.00	SD1013-3	10.00
M9587	7.00	MRF479	8.05	NE73436	2.50	SD1013-7	10.00
M9588	5.20	MRF492	23.00	NE77362ER	100.00	SD1016	15.00
M9622	5.95	MRF502	1.04	NE98260ER	100.00	SD1016-5	15.00
M9623	7.95	MRF503	6.00	PRT8637	25.00	SD1018-4	13.00
M9624	9.95	MRF504	7.00	PT3127A	5.00	SD1018-6	13.00
M9625	15.95	MRF509	5.00	PT3127B	5.00	SD1018-7	13.00
M9630	14.00	MRF511	10.69	PT3127C	20.00	SD1018-15	13.00
M9740	27.90	MRF515	2.00	PT3127D	20.00	SD1020-5	10.00
M9741	27.90	MRF517	2.00	PT3127E	20.00	SD1028	15.00
M9755	16.00	MRF525	3.45	PT3190	20.00	SD1030	12.00
M9780	5.50	MRF559	1.76	PT3194	20.00	SD1030-2	12.00
M9827	11.00	MRF587	11.00	PT3195	20.00	SD1040	5.00
M9848	35.00	MRF605	20.00	PT3537	7.80	SD1040-2	20.00
M9850	13.50	MRF618	25.00	PT4166E	20.00	SD1040-4	10.00
M9851	20.00	MRF626	12.00	PT4176D	25.00	SD1040-6	5.00
M9860	8.25	MRF628	8.65	PT4186B	5.00	SD1043	12.00
M9887	2.80	MRF629	3.45	PT4209	25.00	SD1043-1	10.00
M9908	6.95	MRF641	25.30	PT4209C/5645	25.00	SD1045	3.75
M9965	12.00	MRF644	27.60	PT4556	24.60	SD1049-1	2.00
MM1500	25.00	MRF646	29.90	PT4570	7.50	SD1053	4.00
MM1550	10.00	MRF648	33.35	PT4577	20.00	SD1057	10.00
MM1552	50.00	MRF816	15.00	PT4590	5.00	SD1065	4.75
MM1553	50.00	MRF823	20.00	PT4612	20.00	SD1068	15.00
MM1607	8.45	MRF846	44.85	PT4628	20.00	SD1074-2	18.00
MM1614	10.00	MRF892	35.50	PT4640	20.00	SD1074-4	28.00
MM1810	15.00	MRF894	46.00	PT4642	20.00	SD1074-5	28.00
MM1810	15.00	MRF901 3 Lead	1.00	PT5632	4.70	SD1076	18.50
MM1943	1.80	MRF901 4 Lead	2.00	PT5749	25.00	SD1077	4.00
MM2608	5.00	MRF902/2N6603JAN	15.00	PT6612	25.00	SD1077-4	4.00
MM3375A	17.10	MRF902B	18.40	PT6619	20.00	SD1077-6	4.00
MM4429	10.00	MRF904	2.30	PT6708	25.00	SD1078-6	24.00
MM8000	1.15	MRF905	2.55	PT6709	25.00	SD1080-7	7.50
MM8006	2.30	MRF911	2.50	PT6720	25.00	SD1080-8	6.00
MM8011	25.00	MRF965	2.55	PT8510	15.00	SD1080-9	3.00
MPSU31	1.01	MRF966	3.55	PT8524	25.00	SD1084	8.00
MRA2023-1.5	42.50	MRF1000MA	32.77	PT8609	25.00	SD1087	15.00
MRF134	10.50	MRF1004M	31.05	PT8633	25.00	SD1088	22.00
MRF136	16.00	MRF2001	41.74	PT8639	25.00	SD1088-8	22.00
MRF171	35.00	MRF2005	54.97	PT8659	25.00	SD1089-5	15.00
MRF208	11.50	MRF5176	24.00	PT8679	25.00	SD1090	15.00
MRF212	16.10	MRF8004	2.10	PT8708	20.00	SD1094	15.00
MRF221	10.00	MSC1720-12	225.00	PT8709	20.00	SD1095	15.00
MRF223	13.00	MSC1821-3	125.00	PT8727	29.00	SD1098-1	30.00
MRF224	13.50	MSC1821-10	225.00	PT8731	25.00	SD1100	5.00
MRF227	3.45	MSC2001	30.00	PT8742	19.10	SD1109	18.00
MRF230	2.00	MSC2010	93.00	PT8787	25.00	SD1115-2	7.50
MRF231	10.00	MSC2223-10	245.00	PT8828	25.00	SD1115-3	7.50
MRF232	12.07	MSC2302	POR	PT9700	25.00	SD1115-7	2.10
MRF237	3.15	MSC3000	35.00	PT9702	25.00	SD1116	5.00
MRF238	13.80	MSC3001	38.00	PT9783	16.50	SD1118	22.00
MRF239	17.25	MSC72002	POR	PT9784	32.70	SD1119	5.00
MRF245	35.65	MSC73001	POR	PT9790	56.00	SD1124	50.00
MRF247	31.00	MSC80064	35.00	PT31083	20.00	SD1132-1	15.00
MRF304	36.00	MSC80091	10.00	PT31962	20.00	SD1132-4	12.00
MRF306	50.00	MSC80099	3.00	PTX6680	20.00	SD1133	9.50
MRF313	11.15	MSC80593	POR	RE3754	25.00	SD1133-1	10.00
MRF314	29.21	MSC80758	POR	RE3789	25.00	SD1134-1	2.50
MRF315	28.86	MSC82001	33.00	RF35	16.00	SD1134-4	12.00
MRF316	55.43	MSC82014	33.00	RF85	17.50	SD1134-17	12.00
MRF317	63.94	MSC82020M	130.00	RF110	21.00	SD1135	10.25
MRF412	18.00	MSC82030	33.00	S50-12	23.80	SD1135-3	12.00
MRF420	20.12	MSC83001	40.00	S3006	15.00	SD1136	12.50
MRF421	25.00	MSC83003	82.00	S3007	10.00	SD1136-2	12.50
MRF422	38.00	MSC83005	70.00	S3031	22.00	SD1143-1	10.00
MRF427	17.25	MSC83026	POR	SCA3522	5.00	SD1143-3	17.00
MRF428	63.00	MSC83303	POR	SCA3523	5.00	SD1144	4.00
MRF433	12.07	MSC84900	60.00	SD345	5.00	SD1145-5	15.00
MRF449/A	12.65	MT4150	14.40	SD445	5.00	SD1146	15.00
MRF450/A	14.37	MT5126	25.00	SD1004	15.00	SD1147	15.00
MRF452/A	17.00	MT5596(2N)	99.00	SD1007	15.00	SD1188	10.00
MRF453/A	18.40	MT5768(2N)	95.00	SD1007-2	15.00	SD1189	24.00
MRF454/A	20.12	MT8762	25.00	SD1007-4	15.00	SD1200	1.50
MRF455/A	16.00	NE02136	2.00	SD1007-5	15.00	SD1201-2	15.00

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SD1202	$10.00	SD1304-8	$ 2.50	SD1451-2	$15.00	SRF1427	$50.00	SD1244H12	25.00	SD1410-8	21.00	SD1536-1	41.00	SRF2917	15.00
SD1212-8	4.95	SD1305	3.00	SD1452	20.00	SRF1431	40.00	SD1262	15.00	SD1413-1	18.00	SD1539H	100.00	SRF2918	15.00
SD1212-11	4.95	SD1307	3.00	SD1452-4	24.00	SRF1834	40.00	SD1263	15.00	SD1416	28.00	SD1542H1	170.00	SRF2919	15.00
SD1212-16	4.95	SD1308	3.00	SD1453H1	20.00	SRF2053-3	60.00	SD1263-1	15.00	SD1422-2	24.00	SD1544	26.00	SRF3071PF	50.00
SD1214-7	5.00	SD1311	1.00	SD1454-1	48.00	SRF2092	50.00	SD1272	10.95	SD1428	24.00	SD1545	33.00	SS4006	25.00
SD1214-11	5.00	SD1317	8.00	SD1477	35.00	SRF2147	22.00	SD1272-1	10.95	SD1428- 6084	12.00	SD1546H1	55.00	SS4152	15.00
SD1216	12.00	SD1319	2.50	SD1478	21.00	SRF2225	15.00	SD1272-2	10.95	SD1429-2	15.00	SD1561	79.00	TA7686	15.00
SD1219-4	15.00	SD1345-6	5.00	SD1480	53.00	SRF2264	25.00	SD1272-4	10.95	SD1429-3	14.90	SD1574-1	6.95	TA8559	15.00
SD1219-5	15.00	SD1347-1	1.00	SD1484	1.50	SRF2265	100.00	SD1278	13.75	SD1429-5	15.00	SD1575	6.95	TA8561	15.00
SD1219-8	15.00	SD1365-1	2.50	SD1484-5	1.50	SRF2281	5.00	SD1278-1	13.75	SD1430	12.00	SF4557	25.00	TA8562	15.00
SD1220	8.00	SD1365-5	2.50	SD1484-6	1.50	SRF2371	15.00	SD1278-5	13.75	SD1430-2	18.00	SK3048	5.00	TA8563	15.00
SD1220-1	9.50	SD1375	7.50	SD1484-7	1.50	SRF2347	50.00	SD1279-1	18.00	SD1434	28.00	SL501-59	15.00	TA8564	15.00
SD1220-9	8.00	SD1375-6	7.50	SD1488	22.85	SRF2356	38.00	SD1279-3	18.00	SD1434-5	28.00	SL501-173	15.00	TA8894	15.00
SD1222-8	16.00	SD1379	15.00	SD1488-1	28.00	SRF2378	16.00	SD1281-2	8.00	SD1434-9	28.00	SM7714	5.00	TI8189	3.55
SD1222-11	7.50	SD1380-1	1.00	SD1488-7	27.00	SRF2572	25.00	SD1283	10.00	SD1438	26.00	SRF112	15.00	TP312	2.50
SD1224-10	18.00	SD1380-3	1.00	SD1488-8	28.00	SRF2586	40.00	SD1283-2	10.60	SD1441	56.00	SRF395	50.00	TP1014	5.00
SD1225	18.00	SD1380-7	1.00	SD1499-1	36.00	SRF2597	25.00	SD1283-3	10.00	SD1442	15.00	SRF750	36.00	TP1028	15.00
SD1225-1	15.00	SD1405	21.00	SD1511H3	75.00	SRF2741	40.00	SD1283-4	10.00	SD1444	3.25	SRF769H	20.00	TRV3	5.00
SD1229-7	10.95	SD1408	25.00	SD1520-2	18.00	SRF2747	40.00	SD1289-1	15.00	SD1444-8	3.25	SRF887K3	2.50	TXVP2201/HP	450.00
SD1229-16	10.95	SD1409	18.00	SD1522-4	33.00	SRF2767R	40.00	SD1290-4	15.00	SD1444-9	3.25	SRF989K	15.00	V222-2	25.00
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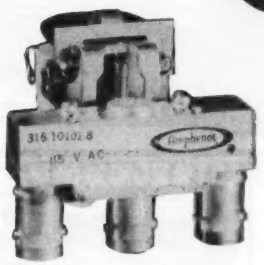

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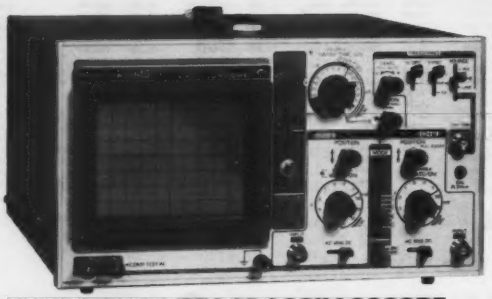

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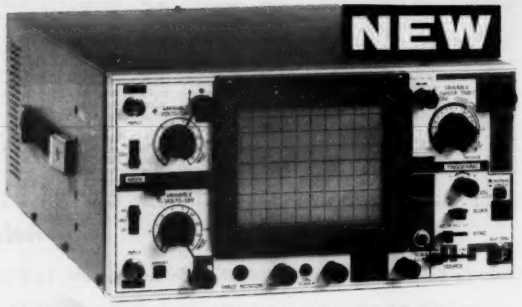

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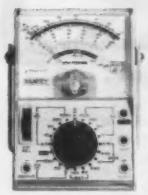

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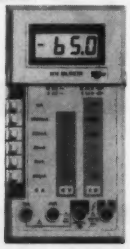

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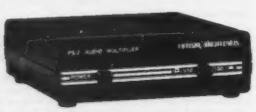

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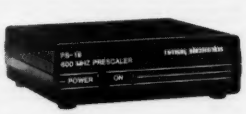

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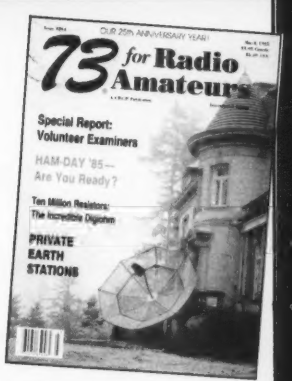

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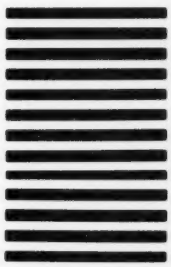

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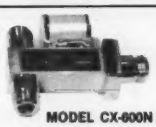
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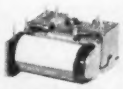
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APRIL IS DX MONTH

April provides plenty of excitement to the deserving DXer. Although the sunspots and propagation have not provided the thrills of previous years, there is still enough DX on the bands to keep all but the 250+ country types glued to their radios. And even the diehard DXer will want to join in this month's activities.

Clipperton

Starting off the DX month of April is a major DXpedition to Clipperton Island, in the Pacific. Clipperton DXpeditions are few and far between, so don't miss this chance to put one of the rarer amateur-radio countries "in the log."

Clipperton Island (FO8) currently sits in the 20th spot on *The DX Bulletin*'s annual survey of most-wanted countries. Clipperton has moved steadily up that list since the last amateur-radio signals were heard from the isolated island in 1978.

The island itself is a tiny atoll due south of Monument Valley, Arizona, off the Mexican coast. The atoll is officially part of French Polynesia, although it lies fully 2500 miles from the nearest inhabited island in that country. The atoll is so flat that the DXpedition needs good navigation simply to locate the spot.

Clipperton sits about 800 miles from Acapulco, Mexico, and it is from Mexico that the 16 or more operators will depart for Clipperton in late March. The DXpeditioners expect to arrive on April 3, and stay about 7–8 days. As with any expedition of this magnitude, there is always the chance of unforeseen delays.

In fact, this same group attempted to get to Clipperton last year. Their chartered ship failed to arrive in Mexico, leaving the operators stranded. This year the group has arranged for more reliable transportation, in the form of a 115' sport-fishing boat. The boat and crew have been to Clipperton previously, a real plus on this trip.

This additional reliability is not without its price, and this Clipperton DXpedition will cost more than $50,000. Needless to say, any financial contribution individual DXers and DX clubs can make toward this trip will be greatly appreciated. Any contributions should be sent to the major sponsor of the trip, the Northern California DX Foundation, c/o Rusty Epps W6OAT, 948-H Kiely Boulevard, Santa Clara CA 95051.

Clipperton's location should mean good radio propagation into the United States. Sitting directly south of the western US and surrounded by water, Clipperton is a fine radio location. Its scarcity on the radio bands stems from the reluctance of the French officials to grant landing permission to all but the best-equipped DXpeditioners. Way back in the 50s, a couple of hams, including W6DX, former president of the ARRL, got stranded on Clipperton during their attempt to activate the rare radio location. The Coast Guard and others were called in to rescue the hams. Since then, Clipperton sees amateur-radio activity only once every few years, as demand builds until a dedicated group of amateurs puts together the detailed plans necessary for a successful, and safe, trip to the island. (A similar situation occurred on privately owned Palmyra Island a few years ago, and the owners have been very reluctant to have hams visit the island since. Not to mention the pirates, but that is another story!)

Let's all hope that nothing stands in the way of a highly successful, and safe, 1985 Clipperton DXpedition. And be sure to check your antenna and rig before the beginning of April, because if you miss Clipperton this time, it will be many years before your next chance. (Thanks to Clipperton DXpeditioner Kip Edwards W6SZN for his assistance.)

International DX Convention

Do you want to hear the Clipperton story firsthand, from the operators themselves? Join your loyal DX editor and many hundreds of DXers from around the world at the International DX Convention, April 19–21, at the Fresno (CA) Center Plaza Holiday Inn.

This convention is one of the highlights of the DX year and is the largest such annual DX convention. In addition to hundreds of west-coast DXers, many other amateurs from around the country and around the world converge on central California each April. Forced out of its former home in Visalia (where the heck is Visalia?) by its rapidly growing size, the International DX Convention features DX news, forums, presentations, and the usual barroom bragging sessions. See you there!

Dayton Hamvention

As if that wasn't enough for one month, April also features the Dayton Hamvention. More DXers get together at Dayton, Ohio, than at any other single event. And even then DXers can get lost in the crowd, as over 20,000 hams gather for the spring ritual that is "Dayton." You can bet members of the Clipperton gang will be there, as well as many other DX notables. The sign-in sheets at the many DX-oriented open houses around Dayton often read like Who's Who in DX.

The Dayton flea market is always good for a pair of tired feet, even if none of the assorted boat anchors, surplus components, or just plain junk catches your eye. And the commercial exhibits feature the latest in everything—an equipment junkie's delight. Doctor DX™ was first seen at Dayton, and many amateur-radio manufacturers debut new products in the overcrowded exhibit area.

If you haven't made your Dayton plans already, there's still time to do so before the gates open on April 26. Contact the Hamvention at Box 44, Dayton OH 45401, and check with the housing organizers at Box 1288, Dayton OH 45402. The DX clubs' hospitality suites are where the action is in the evenings. Check out the Kansas City DX Club's annual blast. (Now there's a DX club that knows how to mix DX with having a good time!) Another one to catch is the Southeastern DX Club's suite. Try Room 325 at Stouffer's. (The Southeastern DX Club will be promoting their DXPO in Atlanta this September 27–29. Save the dates.)

THE TERMINATOR IS COMING

Looking for something to brag about at the DX gathering? Tired of working Clipperton again? Try the "terminator." Neither the Grim Reaper nor the little whatsit at the end of your coax, the terminator is the imaginary line between sunlight and darkness: twilight. Right at sunrise and sunset, radio propagation often improves dramatically. In these days of less-than-ideal sunspots, every little advantage helps, so perhaps it's time you started working with the terminator.

The terminator, or gray line, passes your station twice each day, at sunrise and at sunset. Let's look at what happens to the ionosphere overhead at local sunset. The ionization caused by the sun's radiation gathers in several layers during the day. The highest of the layers useful for amateur-radio DX communication is the F-layer. Most long-haul DX is via refraction within the F-layer. This layer tends to dissipate soon after local sunset, however, and the higher-frequency bands close down for the night.

A lower layer of the ionosphere which affects radio propagation is the D-layer. This layer actually absorbs much of the radio signal and helps short-range communication at the expense of long-haul DX.

However, at sunset, the D-layer quickly falls apart, more quickly than the F-layer. For a short period of time, right around local sunset, you have good long-haul communications, without the weak signals and absorption found during the middle of the day. A somewhat similar process, in reverse, gives good signals at sunrise, too.

In addition to this enhanced propagation, other, poorly understood, things happen to radio signals around sunset (and sunrise). The terminator seems to "duct" signals long distances, without losing strength. The combination of these changes in the ionosphere is often super propagation, for a few minutes.

The improvement over "normal" propagation can be incredible! Signals can come up 40–60 dB in seconds and fade just as fast. But during that short time, Wow! What DX!

It's easy to take advantage of the terminator—just be on your radio at local sunrise and sunset. Your local newspaper probably has the sunrise and sunset times for your hometown. Tune around the bands starting about a half hour before the termination. This will give you a feeling for what is on the band and how strong the signals are. Then you'll be able to tell when the enhanced propagation starts. It doesn't make much difference what band you choose; all benefit from the terminator or gray line. Try different bands on different days, or switch (quickly) from one to another. When you hear signal strengths begin to increase, start calling CQ or call some DX station in a pileup. And keep your logbook handy!

The terminator effect varies with your latitude, or distance from the equator. For once in amateur radio, those in the *higher* latitudes get a break: The gray line lasts much longer the farther from the equator your station is located. This is caused by the angle the sun makes against the horizon as it sets. Near the equator, the sun sets straight down. Anyone who has ever visited tropical countries cannot help but notice how quickly the day turns into night. Up in the higher latitudes, however, twilight drags on for hours. (Above the Arctic Circle, it can last for days!)

So DXers in Florida, southern California, and Texas won't gain as much from the benefits of the terminator as those DXers brave enough to endure the wilds of the north country: New England, the Pacific Northwest, and W9!0. In fact, those of us unfortunate enough to live in the Caribbean get only minimal gains from the terminator.

At the higher latitudes, the gray-line effect lasts much longer than at latitudes nearer the equator, but the effect is less obvious. In the tropics, the gray line provides only fleeting moments of great DX, but those moments are well worth the effort to get out of bed early.

Case in point: I was up well before dawn at my home in Montserrat, in the West Indies. The local weather net convened soon after sunrise, and I was all tuned up on 75 meters. (When you live in the hurricane belt and own radio antennas, you spend a *lot* of time monitoring the weather!) The amplifier was off; no need for power to talk to the locals. Way in the background I could just hear H44DX, from the Solomon Islands, running W6s. Sunrise approached.

Suddenly H44DX's signal strength began to build. S2, S4, S6, over S9! on 75 meters! Even without the amplifier, I tossed my call into the pileup. Back he came, "VP2ML, this is H44DX. Boy are you loud! What are you running?" Almost as fast as I apologized for running 100 Watts into a low dipole, the signal strengths began to ebb. H44DX faded away into the noise. As soon as I signed, KV4FZ, amplifier fan noise in the background, with a huge 75-meter vertical ground plane sticking into the Caribbean, jumped on the frequency and called H44DX. He called and called. Nothing. H44DX had disappeared completely.

I don't get many chances to beat out Herb KV4FZ on 75 meters, but thanks to the terminator, I have Solomons confirmed on 75 before he does.

Those at higher latitudes won't have as

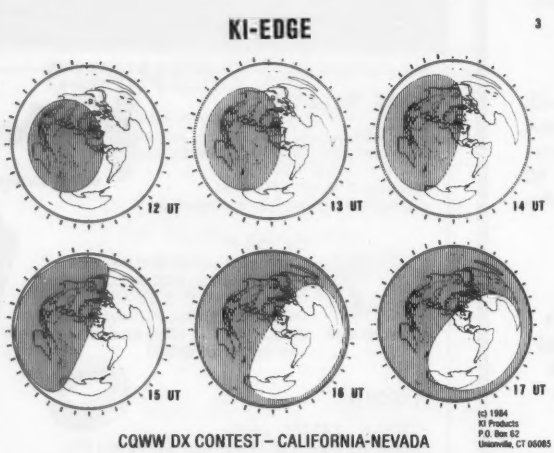

Fig. 1. The KI-Edge, terminator, or gray-line, indicator.

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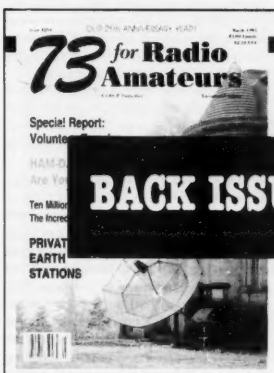

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dramatic a difference, but the difference will be real, nevertheless. The terminator can give you that extra edge you need to make contacts when others can't.

The terminator works both ways. Not only do you enjoy enhanced radio propagation at local sunrise and sunset, but so, too, does the DX station. His signal strength will increase at your location when it is sunrise or sunset at his QTH. This means you can take advantage of the terminator regardless of local time.

The trick is to know the sunrise and sunset times at various places around the world. Your local newspaper will not list terminator times of Moscow, for example. Two relatively inexpensive ways to determine when the sun will rise or set at any place in the world are the DX Edge and the KI-Edge. (The first is a registered trademark of Xantec, Inc., the latter is copyrighted by K1KI.)

Both of these DX aids graphically depict the sunlit and dark portions of the earth, at various times of the day, at various days of the year. By setting the DX Edge for the correct time/date, or looking at the current KI-Edge, the DXer can see exactly where the terminator falls—what countries lie along that line of enhanced radio propagation.

Both DX aids are reasonably priced; less than $20 will cover the costs. The DX Edge includes a map of the world and a series of overlays for each month. You set the current UTC time with the correct month, and presto!, there's the terminator line. The KI-Edge is specific for each location and month and benefits contesters more than DXers, but a complete set of the entire year is still cheap. And the KI-Edge features a Great Circle projection centered at or near your QTH, much more familiar to hams than the Mercator map of the DX Edge. For more information on these DX operating aids, send a self-addressed, stamped envelope to: the DX Edge, PO Box 834, Madison Square Stn., New York NY 10159, or KI-Edge, PO Box 62, Unionville CT 06085.

No matter which DX aid you use, the results are the same. You look at which countries will fall under the terminator when you are on the air. Either send a directional CQ or listen specifically for stations about to pass under the terminator. You can compare two consecutive hours on the KI-Edge, or move the appropriate overlay to the next hour with the DX Edge, to see the direction of movement of the sunrise or sunset line.

Does it work? In a word, yes. You have a better chance of contacting a station when the terminator passes that station's location than at any other time. You can take advantage of the gray-line effect, even if the other station knows nothing about the terminator. Just be on an appropriate band at the right time, and listen in the right direction.

How well does this work? From personal experience, I can testify that following the terminator is well worth the DXer's while. One of my most memorable experiences in DXing was staying up all night to work Russians on 75 meters, as the dawn terminator swept across Asia.

Thanks to the organizational efforts of an active German amateur, I spent an enjoyable night running Russian stations from VP2ML, on 3642 kHz. As the sun rose over each consecutive country, the signal strengths of the stations in that country would rise up out of the noise, and I would work them. Dozens and dozens of stations from rare Russian countries, all lined up for their chance at Montserrat on 75. And all I had to do was stay on frequency and wait for the propagation boost of the terminator. Hour after hour I worked across the continent, filling page after page of the logbook, and giving many Russian stations their first 75-meter contact with Montserrat. It was a night well spent.

While you might not be able to duplicate this performance (the FCC frowns on stateside phone operation on 3642 kHz, and the US is not quite as rare on the bands as VP2M), anyone can enjoy the enhanced propagation of the gray line. Just pay attention to the sunrise/sunset times at the other end as well as your end. And good DXing!

BE MY GUEST

Guest Editorial by Marc Stern N1BLH

HEADS IN THE SAND

The other evening, as I was listening to a repeater, two pieces of information cropped up. The first was a notice of a possible renewal of the attack on 220 MHz and the second was about the 20-kHz two-meter repeater spacing which seems to be creeping across the country. Do you know which of the two elicited the most comment? The two-meter band plan, of course.

The operators on this repeater reflected a "head-in-the-sand" attitude which isn't uncommon, but which is hard to understand in this day of increasing attacks on our spectrum.

Like it or not, we've been big losers recently. The Federal Communications Commission has taken 80 MHz of frequency at 2310 MHz, it has proposed taking away our 5 MHz at 220, and we're in danger of losing 1 MHz of the 160-meter band. Yet, what do most of us talk about? Two-meter repeater spacing. It's a juxtaposition of priorities which makes us wonder just how effective we will be at defending ourselves in the future, if our hobby is to have a future.

Let's face it, the old attitude of "I don't operate there, so I don't care" has to be put on the same shelf with the spark gap. Anytime there's an attack on our frequency spectrum, we all suffer because there are many other frequency-hungry radio services out there literally lusting after our spectrum. And when these services see that we don't put up much of a struggle for our spectrum, they assume it's open season (or will be) on our band space. Don't think it can't happen because it already has. And as more and more bandwidth is needed for information transfer, we will probably feel more pressure.

This isn't to say we can't defend ourselves, because we can. We have proved it in the recent past with the no-code proposal. The outpouring of comments on this proposal showed that we didn't want it and the FCC agreed. So, you can't say we can't have any impact. Yet, looking objectively at the no-code proposal, we see that it too is an example of the myopia that is prevalent in the Amateur Radio Service today. Many operators who opposed no-code did so because they had the attitude that "if I had to do it, so should they." Others believed it was a filter to help keep our bands clean. Yet, this was a shortsighted attitude because once the issue passed from the scene, the army of amateurs crept back into the woodwork, proud it had defeated this issue. Amateurs seemed happy they had met and bested this "ultimate challenge" to our "rights" and they went back to their rag-chews on 75 or 40 CW, oblivious to changes which were spelled out in various footnotes to the WARC-79 agreement.

Those footnotes spelled out the challenges we are now facing. But where is the army of amateurs now? They are still sitting on 75 or 40, talking about nothing in particular or QRMing DX stations or announcing to all that this is "their frequency" and everyone else can get off it.

Does this sound like a harsh indictment of our fraternity? It is, and it's one we deserve. When was the last time you cared enough to follow up on a pressing issue with the FCC? If you're like probably 99 percent of the operators in this country, the answer is years ago. As long as no one gores your ox, you don't care. But let someone come along with a new proposal for changed spacing on two meters and heaven help them. You get up in arms. Meanwhile, the other services chip away at our frequency spectrum and you do nothing about it.

Granted, we have an organization in Newington that is representing us in the halls of power, but that one organization can only do so much, especially in the face of high-powered lobbyists representing commercial interests—the very interests that would like to see amateur radio as extinct as the dinosaur. They would dearly love to get their hands on all of our spectrum so they could put it to good use—as they define good use—making money out of it. They would like to take this precious public resource and make us pay to use it. After all, isn't that what any resource is for, they ask?

And the FCC, with the new Commissioners appointed in the last few years, is backing them up rather than supporting the amateur community. Why else would they even be thinking of taking away 220 or part of 160? The commercial interests have more clout than we have. Yet, we keep our heads in the sand and say nothing will ever happen. But it will and already has.

We are at a crucial point in our history. Recent figures point to a slowing in the growth of the amateur population. Other figures point out that the amateur population is aging and young operators aren't coming into the hobby to help increase our numbers.

There are some operators who would applaud this because they say our bands are already too crowded and we have to keep the number of licensees down. But those operators are just exhibiting the same kind of myopia as the ones who believe "it can't happen here." However, with an aging amateur population and a slow replacement rate, it won't be too long before there are fewer and fewer hams talking to one another.

When this happens, the commercial interests will pounce. They're waiting in the wings, just hoping for us to falter. And they may have good reason on their side. If anyone were to listen to what is going on during amateur QSOs or on our bands today they'd be sorely tempted to take our spectrum away from us. Just listen on 75, 40, or 20 any day and you'll hear jamming, obscenity, QRMing, poor operating techniques, and more. You'll hear people proclaiming their "rights" to this or that frequency and you'll hear ugly pileups on non-rare DX. While all this is going on, we point to our vaunted self-policing. Yet, since this is the situation that does exist, where is that self-policing? If this type of operation is allowed to continue, it won't be long before the commercial interests win out.

We know that hams are anything but saints. As in any portion of humanity, we have people with different thoughts, allegiances, styles. We are only human and do get angry at times, but we must show restraint and good operating practices. We must also continue to provide public service and experimentation, two of our primary reasons for existence.

We can't just hold onto the technology of the past. Wideband AM had its place, and there are still those diehards among us who think that single-sideband operation is just a passing fancy. These diehards prefer to AM away, while ignoring the realities of technology. The same is true of "narrowband" FM. Sure, our deviation is actually 5 kHz and our channel spacing is 15 kHz, but there are more efficient modes in the offing, such as amplitude-compandered sideband (ACSB), which should help ease congestion on our frequencies. But are we experimenting with it in large numbers? The answer is no. There is some experimentation, but without widespread examination of this and other modes, we lose one of our primary reasons for being.

Again, our current thinking places our heads firmly in the sand at a time when they must not be. We must experiment. There are exciting new modes available: spread spectrum, packet radio, ACSB, and more. We must be the leaders in using and proving them as we were years ago when radio was in its developmental years. We can't allow technology to pass us by.

We must also encourage growth and vigor in our hobby and increase the number of young people on our bands. When we do we will grow and remain a force to be reckoned with.

But ultimately we must defend ourselves. We must use our current base to defend ourselves against encroachments on our frequency spectrum. We can't just worry about our own set of operating likes and dislikes. We must think beyond our own horizons and respond to various FCC actions within a short time of their occurrence. We must follow amateur issues closely and provide the kind of support the folks in Newington and in the publishing field need. They are our vanguard, but we must be the soldiers in the field. We must comment. We must contact our legislators. We must act on every issue affecting us. If we don't then we will all lose.

It's time to take our heads from the sand and look at what's really happening. Let's end the QRM and petty repeater squabbles. Let's stop worrying about power measurements and holding onto archaic modes. It's time we awoke to the threats to our fraternity. If we were to do this, we would be able to fend off attacks. Just imagine the clout of 400,000 amateurs in the halls of power: It's an awesome prospect. But if we don't do this, if we don't mobilize our resources, then it is likely we will lose in the end. It's happening now and we must wake up to it.

Marc Stern N1BLH, a journalist by trade, stays active in amateur radio as an ARRL Emergency Coordinator and as editor of the FramingHam Circuit.

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THE WIA

Our early Australian amateur-radio experimenters, with great foresight, knowing that the best way to expand knowledge in any particular field of endeavor is by sharing with others of similar vocation their thoughts and ideas, soon realized that some national forum was needed. With this in mind, they founded the Wireless Institute of Australia, the doyen of National Radio Societies.

Founded in 1910, the WIA is easily the oldest national radio club in existence, with the RSGB (1913) and ARRL (1914) following closely behind. Not a bad effort for an isolated country that had been colonized by Europeans (mainly convicts and their guards, sent out from England) only 130 years previously.

Our 75th Year Celebrations

This year the Wireless Institute of Australia is celebrating its 75th year of service to amateur radio, not only locally but worldwide, as the voice of Australian amateurs. As stated in earlier columns, there will be a great range of activities on all bands and modes of transmission this year to mark this special event.

The WIA is a combination of eight self-governing bodies which are companies registered under separate State Corporate Affairs Acts, and, as such, are responsible for the running of amateur radio within their own division. Each division then has a councillor on our federal body, which is responsible for the decisions made on an Australia-wide or international basis. The WIA has all the usual facilities and services to members that most other good national radio societies have, e.g., QSL bureaus, club rooms, etc., plus a monthly magazine sent free to all members.

The magazine is called *Amateur Radio* and is similar in format and quality to *73* except that it has an average of only 60 pages, but as this magazine is sent free of charge to all members monthly, even overseas members, this alone makes the $A35 annual subscription to be a member of the WIA seem more than fair, considering that the commercially-printed magazines of this size available here are around $A2 or more each, per month, plus postage costs. The WIA also publishes a yearly *Callbook* that covers all VK plus P29 call areas. This is a comprehensive callbook that has 70 pages of callsigns with another 20 pages allocated to suppliers of amateur equipment in our area. The final 76 pages are of good-quality information, covering most things concerning amateur radio in Australia, from repeaters to an electromagnetic interference checklist, DX hints, AMSAT operating, etc.

Several of the WIA state divisions conduct slow Morse-code practice sessions on the air, with the VK2 and VK5 sessions on 3.550 MHz (give or take QRM) at 0930 UTC onwards, seven nights per week, being the most popular in the eastern states. There is usually a different instructor each night, and with some sending stories or jokes as part of the practice session, this makes you concentrate so that you don't miss the punch line; it makes interesting listening. Others send the usual mixed letter and figure groups at speeds between 3 and 16 wpm.

The WIA (VK3 Division) started a nightly broadcast on 200 meters for the amateur-radio fraternity in 1921. This led to what is now a weekly event nationwide. Sunday morning is the time of most WIA broadcasts of local and federal news on most amateur bands. Each division has its own times and frequencies of operation, but a typical time slot would be between 9:30 and 11:00 local state time, with frequencies around 3.600 MHz, 7.050 to 7.150 MHz, and 14.175 MHz (VK6 and VK5), 21.175 and 21.195 MHz being of interest for DX operators. There are also 2-meter FM transmissions via repeaters in most states plus, lately, a trial transmission on 6 meters in VK3.

Perhaps the best way to gauge the worth of a national body representing its members is to ask what kind of relationship it enjoys with its members and with the authorities. In this regard, the WIA is held in high esteem by our DOC, so much so that we are left basically as a self-regulating body with an Amateur Advisory Committee responsible for the behavior of fellow amateurs on the air. The Committee, consisting of a group of amateurs and a DOC representative, monitors all amateur bands. If any amateur transmissions are found lacking in quality, the Committee sends out notices to the offending station, asking it either to explain or clean up operating procedures or quality. If no notice is taken of this friendly request, it then goes to our DOC, which then takes official action if it is deemed appropriate.

But the greatest worth, I feel, is the united front presented on all amateurs' behalf. Some of the latest cases where the WIA has been successful in this regard are—

- The granting of third-party traffic with consenting countries (e.g., America and Canada, with more in the pipeline)
- The introduction of a Novice-grade license
- The abolition of the 30% import duty on amateur gear, reintroduced for a short time last year
- The granting of WARC bands as soon as they become available, plus extra frequencies on the recognized amateur bands
- The abolition of the need to keep logbooks

The list is endless.

My Opinion

The WIA, to me, is like a trade-union movement, with its members paying for services rendered (e.g., better wages, better working conditions, legal representation, and liaison with the government of the day).

This poses a question. How many people, outside a union movement, refuse that extra $10.00-per-week raise, or the extra benefits that the union members get for them via their donations to an organization presenting one voice, for the betterment of all? Conversely, how many nonmembers of a national radio organization representing them refuse to use the added advantages gained by that organization on behalf of its members? E.g., larger frequency allocations, no log books, the fight against tower height limitations, representation to the DOC to eliminate spectrum anarchy on the bands, etc., etc.?

We all believe in freedom of choice in our democratic system, but we should also believe in every person pulling his fair share of the load. I feel sure that if these nonmembers had to fight the battles that organizations like the WIA do on their behalf, on an individual basis, they would be the first to stand up and shout "Why isn't something being done?" They are very lucky that members of organizations like the above are not so shortsighted.

Happy 75th birthday, WIA!

BRAZIL

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NEW PRESIDENT OF LABRE

For about two years, Valmir Jacinto Pereira PT2FA was the president of the Brazilian Amateur Radio League (LABRE). During the time he commanded the League, Valmir gave his best efforts to establish reciprocal agreements with the leagues of almost all foreign countries. Most of them accepted his offer, and a few agreements were signed. Due to his excellent administration, PT2FA received from the Brazilian government the Merit of the Communications Medal.

On September 25, a new president was elected. Francisco Jose de Queiroz PT2FR will take care of our League and we hope that he can do a good job for us. Jose George da Rocha PT2GN is the vice-president, and the staff members are Pedro de S. Maciel PT2GAT, Paulo C. P. F. Pedroza PT2PPP, Jose Bonifacio F. dos Santos PT2YI, Ricardo Silva PT2RS, Pedro F. Filho PT2FF, Jose R. Medeiros PT2UN, Hugo A. da Silva PY2DSQ, Iran M. Jr. PT2ACZ, and Hardy Jost PT2NM.

SILENT KEY

A few months ago I wrote that November 8, 1984, would be a special day for Brazilian amateurs. That day was supposed to be celebrated as the centennial of Sebastiao Mattos PY1SM, a very active amateur in spite of his ninety-nine years. But God called Mattos less than one month before his birthday. He passed away three days after a heart attack, and his death represented a loss to all of us. Certainly he was the oldest active amateur in the world.

SPECIAL PREFIX

To celebrate the 50th anniversary of the University of Sao Paulo, a few PY2 stations were active during the second weekend of October, 1984, using the call ZY2AA. A special commemorative QSL will be sent confirming the QSO. The QSL information is PO Box 22, 01000 Sao Paulo, SP, Brazil.

WWSA—WORLDWIDE (CW) SOUTH AMERICA CONTEST

Sponsored by Grupo Editorial Antenna, from 1500 UTC June 8 until 1500 UTC June 9, 1985. CW only, from 10 to 80 meters. Work stations once per band. No crossband QSOs. Exchange: signal report and serial number. Classes: single operator—single band or multiband; multi-operators—single transmitter and multiband.

Count two points per QSO with a South American station. QSOs between South American stations count only for multiplier.

DXCC countries worked on each band count as multipliers for the South American stations.

South American prefixes worked on each band count as multipliers for the rest of the world stations.

Multiply QSO points on all bands by number of multipliers on all bands.

Entries must be postmarked by July 31, 1985. Mail to WWSA Manager, PO Box 18003, 20772 Rio de Janeiro, RJ, Brazil.

ANTARCTICA

The Communications Department (DENTEL), considering the importance of the Third Antarctica Mission sponsored by the Brazilian Navy, issued a special prefix for the first Brazilian amateur-radio station in Antarctica: ZX0ECF. The equipment will be installed in the Oceanographic Station, which is called Estacao Oceanografica Comandante Ferraz, and the license is valid up to April 30, 1985.

CHILE

Patricio Fernandez H. CE3GN
Ceramica Espejo S.A.
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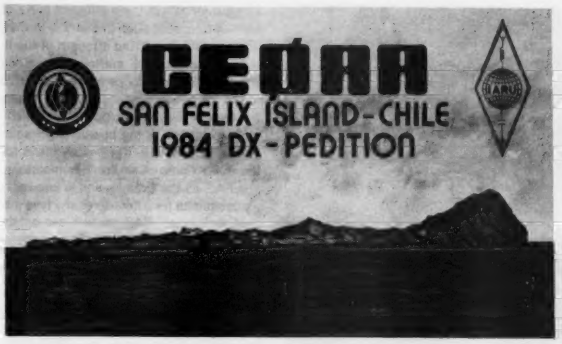
Casilla 14781

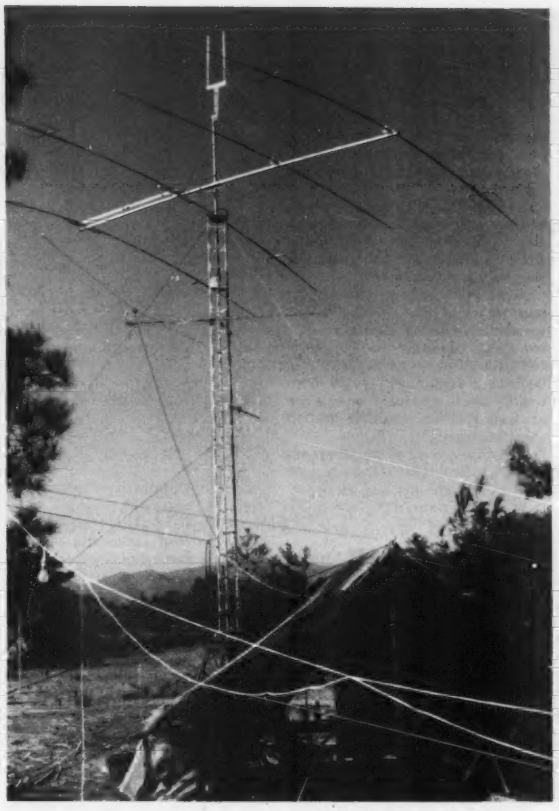
CE0AA SAN FELIX DXPEDITION

On the 21st of August, Rogelio Gomez CE3GF, president of Radio Club de Chile, gave me a phone call and told me: Patricio, this is it! The Navy has finally authorized the DXpedition. You have exactly ten days to organize everything and that includes the training of the operators who, although licensed hams from the Navy, have had very little experience in DXing and only spotty knowledge of the English language.

Under those circumstances, the task was formidable! We had too many negative factors: In addition to having very little time to train the operators and gather up all the necessary gear, we had to try to convince a number of directors and members from our radio club who did not wish to support or collaborate with a DXpedition of this nature. Radio Club de Chile had been in close contact with the Chilean Navy authorities (who are in charge of the island) for over 7 years, trying to get approval for the San Felix visit, and now that we had it, too many people thought



Left to right, standing, CE3GN, CE3ESS, CE9DVN; sitting, CE2GXY and CE3BBW.



Antennas and tent used for the Field Day by 5B4NC, the Nicosia Radio Club.

that the lack of experience of the operators might turn everything into a complete failure.

Nevertheless, having met the operators, Fernando CE2GXY and Max CE9DVN (both of them professional Navy radiomen and CW operators), I knew that we could do it, because above all they had big hearts, were most cooperative, and wanted to learn fast. In addition, they would be going to the island for a period of about 2 months, so I thought that if at first we used list operation procedures until they gathered up some experience, everything would end up fine.

In order to make a long story short, I will tell you only that during the week prior to the departure, the Radio Club de Chile headquarters resembled a beehive! I will never forget the great collaboration from friends such as German CE3CBG, Enrique CE3BBW, Mickey CE3ESS, Eduardo CE3BOC, Jorge CE3CTI, Marcelo CE3BXP, Celso CE3ACA, and others, who spent countless hours at the club helping, organizing, training Fernando and Max, and packing all the gear.

The equipment was furnished by both Radio Club de Chile and many of its members privately. In that respect, I would like to publicly thank Pablo CE3AJN, CE3ESS, CE3BBW, CE3CBG, Michel CE3DPD, and CE3BXP for having so generously lent their valuable transceivers, antennas, and accessories which were so vital to the DXpedition.

After arriving at the island on the 31st of August, both Max and Fernando worked practically all day and night until they had all of the equipment operating. By the way, the main gear consisted of one TS-600, two 830-S, one AT-230, a Honda E500 generator, a TET 4-element tribander, and inverted vees for 160/80/40 meters. Everything performed flawlessly during the 2-month period which the DXpedition lasted.

On Saturday, September 1st, the first contacts were made with Santiago, and last-minute instructions were given for the official opening which would be the next day. And on that Sunday, after the first contacts were made, all hell broke loose as thousands of eager DXers tried to make a contact directly, without the help of the controllers. It took the controllers about one week to smooth things out and make most people understand that it would have to be list operation or nothing, at first, in order to make things easier for Fernando and Max. After all, San Felix had been included in the lists of the top 10 most-wanted countries for many years, so the demand was unbelievable.

After the first two weeks both operators had acquired much experience, and from then onward the DXpedition worked out very smoothly.

Those of you who heard the operation realize the magnificent job done by the net controllers. Many of them spent as much as 6 to 8 hours daily during the whole operation. My sincere thanks to CE3ESS, CE3BBW, Carlos CE3EEO, CE3DPD, CE3BOC, Ralf CE6EZ, Carlos CE3NR, and Mario CE6COR for a job well done.

Foreign net controllers played a vital role too, especially when propagation prevented local controllers from contacting the island due to skip conditions. In spite of the language barrier, it was incredible to hear how people like Toshi JA1ELY handled matters smartly and fast. Others like Eva PY2PE, Phineas W6BF, Ron KB7SO, Jack WB4GCP, Gail KF4IL, Jim KB7QC, John KCØYI, Loren K6EDV, Tex W8AHV, James NB7R, and Neil HKØHEU, to name a few, contributed immensely to the success of this operation, proving once more that international goodwill and understanding can do wonders.

On October 4th I had to leave Santiago for a business trip outside the country, so Enrique CE3BBW was named general controller in charge of the operation. Before mid-October, Enrique wisely judged that the operators on the island had acquired enough experience and should be left alone, without assistance from the mainland. In that way, the DXpedition ended up with Fernando and Max working on their own and in such a way that nobody was able to criticize.

There is no official way, to my knowledge, to measure the success or failure of a DXpedition, but if number of contacts and bands and modes count for this evaluation, there is no doubt that this operation made a great number of DXers around the world very happy.

Here are some facts:

- Contacts: Over 32,000
- Bands: 160, 80, 40, 20, 15, 10, and 6 meters
- Modes: SSB, CW, and RTTY

During the first weeks of operation, criticism and misunderstandings were common on the bands. We even know of a few US DX bulletins which published disgusted opinions on the way the DXpedition was being handled. I trust that those who criticized at first will now understand. If not, we can't let it bother us because we know that over 32,000 hams all over the world now have a new one: San Felix Island!

CYPRUS

Aris Kaponides 5B4JE
PO Box 1723
Limassol
Cyprus

During the 1984 IARU Region 1 HF SSB Field Day Contest, two stations from Cyprus took part, the Nicosia Radio Club 5B4NC and the Larnaca Club 5B4LC. From Nicosia was sent to me the following report:

The location of the Field Day Contest was the same as last year's, a place called Kambia, about 10 miles out of Nicosia on the top of a hill. This year it was decided to use a four-element fourbander by TET which was mounted on a 26-foot tower. Also, dipoles for 40m, 80m, and 160m were used. The installation of the antennas was done early in the morning by a group of young amateurs and the rest of the group arrived later in the afternoon with the rest of the gear, which included a generator, a transceiver, a portable refrigerator, the drinks, and all the necessary foodstuffs for the traditional barbecue.

The weather was fine during both days, and on Sunday some of the XYLs visited the place and had lunch with the group.

The main thing about this year's contest is that the number of people taking part has increased. This year the following members of the Nicosia club took part and helped in many ways: Marios 5B4NM

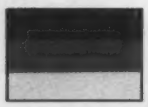
with his daughter Marianna 5B4MB, Spyros 5B4MF, Andreas 5B4LP, John 5B4MC, Marios 5B4OJ, Nicos 5B4IT, George 5B4NJ, Vias 5B4OL, Phidias 5B4OK, Andreas 5B4OM, Aris 5B4GZ, Costas 5B4FR, and Markos 5B4EP.

The main objectives of amateur radio are comradeship and the spirit of contests (which is not winning, but trying to win by being at one's best) and everybody had a nice time.

Other activities in Cyprus of the radio amateur fraternity included at the beginning of December the Annual Dinner Dance of CARS, which was in Nicosia this year and was a great success.

On the operation side, 5B4s can be heard mostly on 20m, although there is some activity also on the other bands. On 75m I was copying very well, long path, 1500 UTC, AA6AA, on the 30th and 31st of December and 2nd of January 1985. Unfortunately, due to my linear needing a new bandswitch and due to the QRM, the QSO was not completed.

On 2m there is some DX activity via meteor scatter by 5B4LP. There is some RTTY on 20m and 15m, and very soon, there will be some SSTV activity by 5B4CV, 5B4JE, and 5B4OV.



FEDERAL REPUBLIC OF GERMANY

Ralf Bayer DJ3NW
Opferkamp 14
3300 Braunschweig
Federal Republic of Germany

SATURATION

Thinking of all the fancy and expensive communication equipment found in many amateur-radio shacks in this country, I consider German hams rather wealthy. Only a minority of them, however, are technology-oriented and still experimenting. The rest are more consumption-oriented, and with the present state of the art, the technological means for reliable and easy communication are within reach of the average German radio amateur today.

It is not surprising, therefore, that the enthusiasm for establishing contact even with a faraway station dwindles. Can you imagine, for example, the excitement of a radio amateur in Botswana using a 20-Watt CW transmitter and a dipole who gets a response from Germany? How would you rate, in contrast, the feelings of one of us who contacted Maximo CE9AA the fifth time on the same band in the same mode and gave him that boring 59 report although he was 3 by 4? Saturation makes the difference!

Saturation has many facets and aspects. Who is not fed up with the lousy modulation of the majority of stations in that particular part of the world which is the origin of numerous threats to amateur radio? It is evident that the trouble is not primarily a technical matter but a consequence of operator mentality (*"I'm working from a club station and I'm not in charge of maintaining the equipment"*). So we simply ignore these stations and try to live with their contribution to the pollution of the bands rather than giving them any advice on possible improvements.

A look at the content—the wording—of many QSOs reveals a comparable attitude. Hello, signal report, QTH, name, rig, 73, and good-bye is the recurrent format of the majority of them—a perfect case for automation. Of course, linguistic problems, pressure of time, and some other

Members of the Nicosia Radio Club. From L to R, Nicos 5B4IT, Markos 5B4EP, Marios 5B4NM, Phidias 5B4OK, and Andreas 5B4OM.

limitations demand this format sometimes. But it seems to be much easier to run through the same procedure even under the most comfortable operating conditions than it is to exhibit some mental flexibility, because it requires minimum effort and still gives the conviction that one is part of the game called amateur radio. Saturation again!

On the other hand, real gratitude is expressed most of the time if the correspondent at the other end of the line tries to convert the monotonous exchange of statements into a smooth flow of conversation, shuffling arguments and ideas back and forth.

Saturation has already become an issue in advertisements like the "Public Notice" of Bencher, Inc., published quite recently. In this particular advertisement they are emphasizing the thrills and satisfactions one can expect from personal achievements like the mental en-/decoding of telegraphy signals. I think, besides the commercial purpose of this advertisement, they have raised a crucial point of amateur radio: The more technical means for reliable and comfortable communication become available to everyone, the more difficult are personal achievements utilizing the more or less uniform communication equipment of the future.

But opposition against better-than-average personal achievements and higher qualification of one's neighbor is already with us. High-speed telegraphy at more than 40 wpm or so with mental en-/decoding is one of its targets. Deliberate interference to high-speed telegraphy QSOs and continuous requests for QRS without self-identification are unambiguous signs. Interruptions of foreign conversations ("Speak English or we QRM your frequency") can be heard from time to time on the frequencies of national DX nets and are another sign.

Much has been said about the future of amateur radio. A relatively small group of technology-oriented hams will advance the means of communication further and further. But the majority of radio amateurs should develop other powerful resources for a more interesting and more human utilization of the technical means. Awards and contests fulfill their purpose in creating pseudo-activities on the bands to defend the existing frequency allocations and to prove that there is a need for band extensions. However, they are not considered useful in the context of a more fruitful utilization of technical means.

More natural conversations, more interest in the fellow amateur's success or misfortune, demonstrations of courage of one's own conviction, abstention from complimentary signal reports, acquisition of some knowledge of foreign languages, spending a bit of our valuable time to give a hand to fellow amateurs, and many other such changes will help us much better to overcome the effects of saturation and to maintain and to strengthen amateur radio in the long run.

GREAT BRITAIN

Jeff Maynard G4EJA
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Widnes WA8 9RP
Cheshire
England

THE UK SCENE

You may have noticed that after nearly two years of monthly contributions to *73* I have been relegated to a bimonthly contribution. This is not, I hasten to point out, an adverse reaction by *73* editorial staff but reflects the tremendous interest that "73 International" has generated. So many correspondents are now sending regular reports that there is insufficient room for yours truly every month. I may, therefore, report some items in a briefer-than-previous manner in order fully to cover the UK scene.

Fifty MHz comes closer to full availability for UK amateurs with the recent addition of 60 special licenses for this band. This brings to 100 the total number of 50-MHz operators currently operating in the UK. You will recall that with the imminent demise of television broadcasting in the 49-MHz band, the Department of Trade and Industry (the UK regulatory body) was persuaded to allow 50-MHz amateur operation outside broadcasting hours. Already there are many reports of good 50-MHz DX from the UK and 50/28 crossband contacts within the UK.

I have referred previously to the change in the UK telephone scene following the liberalization of British Telecom. An interesting variant of this theme comes recently from a piece of newly-liberalized hardware (you will remember that we now have a huge range of legal telephones to be bought in High Street shops). A British-Telecom-supplied Ambassador-type telephone (widely available for about $80.00) was found to be radiating within the 2-meter amateur band. It was actually putting out signals in three different parts of our 144-MHz allocation and in one further, non-amateur, band. The strength of the illegal radiation was sufficient to block channel S20 two blocks away. Since S20 is the FM simplex calling channel, it was not too long before a complaint was filed!

An indication of the popularity of amateur radio in the UK is given by plans for the 1985 Radio Amateur Examinations. The RAE, as the examination is known, is a prerequisite for a license of any type (except reciprocal). RAE centers are established only twice a year, in May and December. This year there are over 400 examination centers.

I wonder if you have yet heard the special-event callsign GB4DIS/MM? If you have, you can count yourself very lucky. The station is aboard the Royal Research Ship *Discovery* en route from Gibraltar to Montevideo (Brazil) via Port Stanley (Falkland Islands) and Ponte Arenas in Chile. Additionally, *RRS Discovery* hopes to call at South Georgia and establish a land-based amateur station. Operation on SSB and CW is promised with a possibility of RTTY as well. Spot frequencies are given as 14.023 and 14.123 MHz.

I still get a great deal of mail from *73* readers. I enjoy reading it—some even refers to amateur radio! I do, of course, reply to every letter received, but correspondents should be patient. Although my home address is still as listed above, I now work in London and am not home too often. When I do get back I like to spend some time with the family as well as play some golf. I am also finding myself in the USA frequently, and just as soon as I get myself organized, I will reapply for my US license and bring a rig with me. New York residents particularly should listen for G4EJA/W1.

ISRAEL

Ron Gang 4Z4MK
Kibbutz Urim
Negev Mobile Post Office 85530
Israel

The lowest spot on the face of the Earth is the Dead Sea, 394 meters (¼ mile) below sea level. From the north, the Jordan River drains into it, and from all other sides it receives the winter runoff from the wadis (dry river beds) of the surrounding desert. It's 78 kilometers (48 miles) long and 18 kilometers (11 miles) at its widest spot. Due to the great evaporation and continual inflow of water, its salt content is 25 percent of its water by volume, which is exploited by Israel and Jordan, on the western and eastern shores respectively, for the chemical wealth which it contains.

Not far from the salt mine at S'dom (thought to be the site of the Biblical Sodom of ill repute) stands a pillar of salt with a resemblance to the human form which tourists are told is the remains of the wife of Lot who, according to the Bible, when fleeing the city of Sodom which the Lord was destroying for its great wickedness, turned back for a last look and was transformed into a pillar of salt.

Indeed, during the summer months, the daily temperatures here are in the mid-40s Celsius (over 100 degrees Farenheit), and the area is quite inhospitable. Due to the high salt content of the Dead Sea water, no living organisms can survive in it and thus it is quite dead! Nonetheless, with the area's therapeutic hot sulphur springs, the oasis of Ein Gedi and the historic fortress of Masada (see my col-

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umn, 73, April, 1984), the Dead Sea area is quite an attraction to visitors.

From the sixth through the thirteenth of April, in cooperation with the Israel Amateur Radio Club, the Holon Bat-Yam club will be operating from this lowest spot in the world. A special callsign, 4X5DS (note the special prefix), has been allocated and a triband beam has been flown in from a donor in Germany.

Operation on all bands from 80 meters through 10 is planned on SSB, CW, RTTY, and possibly SSTV. A commemorative QSL has been printed and will be sent to all stations contacting 4X5DS. As well, a special certificate will be awarded to amateurs contacting the station on either three different bands, modes, or days.

No doubt, it will be real challenge for many to contact 4X5DS as the location, at the bottom of the Great Rift Valley, caused by a geological fault running from Syria to Eastern Africa, is fenced in by mountains on the east and west. Coupled with the poor conditions characteristic of this point in the sunspot cycle, it will be quite an achievement for faraway stations to make contact.

NEWS FROM AMSAT ISRAEL

The Israeli chapter of AMSAT has been officially formed and meets on Sunday evenings once every two weeks at the Tel Aviv University, in the same building that houses 4X6TU, the beacon that appears on the International Beacon Frequency of 14.100 MHz once every ten minutes. The aims of the chapter are to propagate information about the use of amateur satellites, to establish a club station for the use of its members to work through the birds, and hopefully to take part in the construction of a portion of a future satellite.

Although at the present time only seven or eight stations in Israel have OSCAR capability, interest is running high and thirty hams attended the last meeting.

The current meetings have taken on an educational air, with Yair 4X4GI giving fascinating lectures in a fashion that the layman can easily understand. In the last meeting, he outlined the history of the satellites starting from the first Sputnik, which he monitored on 20 MHz in 1958, and recalled the article which Arthur C. Clarke published in *Wireless World* in 1945, proposing then three geostationary satellites making worldwide communications possible, giving scientific proof that the idea was feasible. Yair pointed out that OSCAR I, the first satellite of the amateur-radio community, with its famous beacon transmitting HI in Morse, appeared only three short years after the Sputnik.

Yair then went into the physics and mathematics, showing what the parameters are of different kinds of orbits, what constitutes a geostationary orbit, a highly elliptical orbit such as that of OSCAR 10, the explanation of terms like inclination, subsatellite contact point, Kepler's Law of Equal Areas, etc. All of us present were indeed held spellbound!

KOREA

J. Michael Wengert KH2AC/HL
c/o ABC News
CPO Box 2961
Seoul
Korea

As it has been some time since the last column from Korea, here are some of the ham-radio club activities in Korea.

AARCK (American Amateur Radio Club—Korea) This group, made of of US Forces military and civilian personnel stationed in Korea, meets on the second Saturday of each month and provides a well-equipped club station (HL9TX) for the convenience of US soldiers who are unable to set up their own stations due to space limitations or who are here for a short period of time. Membership is open to anyone. Club president Craig Nicholson HL9NC operates as net control for the Far East Net on Sundays (0100 UTC—14.285 MHz) and airs the *Westlink* tapes (0130) for the benefit of hams all over the Far East and Southeast Asia. AARCK also operates the QSL Bureau for HL9 hams. Address for club and for QSLs to HL9 hams only: American Amateur Radio Club—Korea, Dependent Mail Section, APO San Francisco 96301.

SIARA (Seoul International Amateur Radio Association) This rapidly-growing group was organized for the following two purposes: to promote friendship between Korean hams and hams from other countries who reside in the Seoul area through regular meetings, nets, and social activities, and to promote reciprocal licensing agreements between the Republic of Korea and other countries.

While success in the second purpose seems to be some time in coming, the first purpose is rapidly being realized. A net began at 0700 UTC on 21.288 (88 for the '88 Olympics to be held in Seoul) on Saturday, January 12, 1985. Check-ins are welcomed from anywhere. Net control is Tom Nickle (W3GNM) operating his local station HL9XX. If you are interested in contacting this group, you may write to me at the address at the head of this column. If you live in the Seoul area and would like to call, the number is 734-8111 during working hours. This is an international group and anyone of any nationality with a license or interest in amateur radio is welcome.

In 1984, *KARL (Korean Amateur Radio League)* got a new slate of officers and has expanded greatly. My next column will feature this progressive and active organization.

Till then, 73 from Korea, the Land of the Morning Calm.

MONTSERRAT

Errol "Bobbie" Martin VP2MO
PO Box 113
Plymouth
Montserrat
British West Indies

LIVE FROM MARS

Well, once again it's brand new year, and for some of us it's new in more ways than for others, in the world of amateur radio.

In retrospect, 1984 was a very interesting year indeed. With Mother Nature doing the usual magic that only she is capable of, some of us were given the chance to defy her by working that new DX country to add to our Totem Pole, while others were provided another excuse for not being able to hear, let alone work, that elusive new one.

Here on the island of Montserrat, the Montserrat Amateur Radio Society (MARS) was continuing its usual activities: the daily disaster preparedness exercises via our local 2-meter repeater on the frequency 146.37/.97, also the regular exposure to the public by way of demonstrations and displays, along with scheduled amateur-radio training classes for persons interested in becoming amateur-radio operators, with special emphasis placed on the youths today, who will be the adults of the future.

This year started out very well for the operators of Montserrat in spite of the declined state of the sunspot cycle, for many have gotten out those rolled-up, forgotten pieces of copper wire and have been active on the low bands, which have been very responsive at nights, and I have worked many new ones.

For two young students of the Montserrat Amateur Radio Society, 1985 marked the birth of a new experience, for after a long series of studies, these two youngest hams took their exams, successfully passed, and were issued their licenses. These youths are Eddie Weekes VP2MIW and Franklin Rogers VP2MFG. They are now looking forward to obtaining their equipment and getting on the air as soon as possible. By the laws of Montserrat, no one is allowed to possess amateur-radio equipment unless he has obtained a license first. Here's wishing both Eddie and Franklin a very hearty welcome to the world of amateur radio.

LICENSING

Unlike many administrative licensing systems where the requirements are solely based upon the knowledge of Morse code (CW) and electronic theory, the qualifications for becoming an operator are not based on the above-mentioned standards only. In fact, Montserrat, being a 39-1/2-square-mile British Colony, has only two classes of licenses, A and B, but because of the fact that each resident considers himself to be an ambassador of his country on an international level (some might not realize this), no resident Montserratian would even consider taking the lower, thus restricted, class of exams. One studies for the more demanding level, and even if one fails on the first attempt, one usually brushes off the dust and tries again until met with success.

The licensing requirements on the Island of Montserrat are as follows: (1) To be able to copy and send Morse code at a speed of 12 words per minute. (2) To possess a clear knowledge of the fundamentals of electronic circuit theory relative to amateur radio. No big thing, you might say, but wait, that's not all; the real clincher comes next: (3) One has to possess the qualities of an "upstanding" character.

Therein lies the difference from other systems. Even though one can send CW at 100 wpm along with being an electronic engineer, those are definitely not enough reasons to permit one on an international medium such as worldwide communications, for, as stated above, each amateur-radio operator is an ambassador of his/her country, and amateur radio exists to promote peace and goodwill among men and women. One's operating, whether good or evil, is directly reflected back on his/her country, and who wants to disseminate garbage only to have it returned in one's face? Have you ever noticed the mannerism of resident VP2M operators? It is not surprising, for our country is a very small one of which we are all very proud, so we will never do anything to tarnish the fine image of this little emerald isle.

Let me point out once again that the Island of Montserrat has reciprocal licensing agreements with many countries, and following is a list of the requirements. Please write a letter of application to the licensing officer, Mr. Joseph Skerritt, Ministry of Communications and Works, General Turning Road, Plymouth, Montserrat, British West Indies.

Enclose (a) a copy of the license of the country of nationality (or in the case of being a resident of or citizen of another country, documents must be provided to substantiate that claim), (b) a recent photograph of the applicant (this is a recently added requirement), (c) an international money order in the amount of approximately $7.00 (US funds) made payable to The Accountant General, (d) estimated itme of intended arrival and proposed length of stay on the island, and (e) intended address while here.

This information should arrive here at least two (2) months prior to the intended visit to allow time for the processing and the unpredictable mailing service.

CUSTOMS REQUIREMENTS AND DUTIES

Amateur-radio equipment is not duty free on this island *except* in the exclusive case of the Montserrat Amateur Radio Society and it's members, who have acquired this by the continued services being rendered on a daily basis, so visitors to the island pay a deposit which is returned upon exit at the port of entry. *Please note* that one should notify the Customs Department at least one day before departure and if it is towards a weekend, make this the last working day at least—Friday.

QSL INFORMATION

The Montserrat Amateur Radio Society meets on the first Wednesday of each month and welcomes any visiting ham to any of its meetings. One can always keep in touch via our local repeater, which is accessible from all parts of the island. Upon arrival, please get in touch with our Secretary/Treasurer, Ursula Sadler (Mrs.) VP2MDY either on two meters or via the land line which is listed in our local telephone directory, so that arrangements can be made for forwarding of those inevitable QSL cards that always seem to follow an operation here.

IRCs and Return Postage

Given the fact that we do not operate a QSL bureau here on the island, and that someone will always say he didn't hear the Manager's name being given, the question comes up about return postage, or more to my concern, IRCs (International Reply Coupons). This is the most misunderstood area of QSLing, and for this reason I state the following, with special concern regarding the US relative to the Caribbean.

One IRC costs US$0.65, which is equivalent to $1.76 ECC (Eastern Caribbean Currency), but nevertheless, IRCs are almost worthless here! Two IRCs are valued at about 80¢ ECC and are quite insufficient to mail a letter (single unit) to the US, the postage being $1.15 ECC. Even though in raw currency US$1.00 is equivalent to $2.71 ECC (which is fixed to the US dollar), IRCs do not necessarily reflect monetary exchange rates.

Of course I can't encourage you to send money in the mails, but on the other hand, in the Western world, who isn't doing it? Please absorb some of the strain of the Caribbean hams by sending them the proper amount of postage. Just for the record, it works both ways, for I always send at least two IRCs to the US Manager for QSL returns when it requires only one.

I hope to be able to provide you readers with further updates and thoughts on the subject of amateur radio from a Caribbean view, so please keep on looking at these pages for much more in the future. In the mean time, also between time, do have a very healthy 1985 and gud DX to you all. Keep the faith and the hobby going, better times are always ahead. Stay tuned to this frequency as we are Very Pleased To Make Oscillations (V-P-2-M-O).

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If you own an Air-1 with AMTOR, we will supply you with an updated set of "high rate bit sync AMTOR+" ROMS plus as a bonus, a disk which contains the real-time disk communicator and ASCII Tokenizer programs for sending programs over the air. Just send in your present ROMS (two 2764's with their labels intact) and $35. We'll rush you the new ones.

If you have an Airdisk, send it with $10 for the update. Send to Microlog Corporation, 18713 Mooney Drive, Gaithersburg, MD 20879. Tel: 301 258-8400.

*A digital communications technique of continually adjusting an internal clock to match the received signal's bit rate.

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PROPAGATION

Jim Gray W1XU
73 Staff

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
ARGENTINA	20	20						15	15	15	15	15
AUSTRALIA						40	20	20			15	15
CANAL ZONE	20	40	40	40	40		20	15	15	15	15	20
ENGLAND	40	40	40				20	20	20	20		
HAWAII		20			40	40	20	20				15
INDIA							20	20				
JAPAN							20	20				
MEXICO		40	40	40	40		20	15	15	15	15	
PHILIPPINES							20	20				
PUERTO RICO		40	40	40	40		20	15	15	15	15	
SOUTH AFRICA								15	15	15		
U. S. S. R.							20	20				
WEST COAST			80	80	40	40	40	20	20	20		

CENTRAL UNITED STATES TO:

ALASKA	20	20						15				
ARGENTINA									15	15	15	
AUSTRALIA	15	20				40	20	20				15
CANAL ZONE	20	20	40	40	40	40			15	15	15	20
ENGLAND		40	40					20	20	20	20	
HAWAII	15	20	20	20	40	40	40					15
INDIA								20	20			
JAPAN								20	20			
MEXICO	20	20	40	40	40	40			15	15	15	20
PHILIPPINES								20	20			
PUERTO RICO	20	20	40	40	40	40			15	15	15	20
SOUTH AFRICA										15	15	20
U. S. S. R.								20	20			

WESTERN UNITED STATES TO:

ALASKA	20	20	20		40	40	40	40				15
ARGENTINA	15	20		40	40	40					15	15
AUSTRALIA		15	20	20			40	40				
CANAL ZONE			20	20	20	20	20	20				15
ENGLAND									20	20		
HAWAII	15	20	20	40	40	40	40					15
INDIA		20	20									
JAPAN	20	20	20			40	40	40			20	20
MEXICO			20	20	20	20	20	20				15
PHILIPPINES	15							40		20		
PUERTO RICO			20	20	20	20	20	20				15
SOUTH AFRICA										15	15	
U. S. S. R.									20			
EAST COAST		80	80	40	40	40	40	20	20	20		

A = Next higher frequency may also be useful.
B = Difficult circuit this period.

G = Good, F = Fair, P = Poor.

APRIL 1985

SUN	MON	TUE	WED	THU	FRI	SAT
	1 G	2 G	3 F	4 F-P	5 P	6 P-F
7 G	8 G	9 G	10 F	11 G	12 G	13 G
14 G-F	15 F-P	16 P	17 F-P	18 G	19 G	20 G
21 G	22 G-F	23 P	24 P-F	25 P-F	26 F	27 G
28 G	29 F-G	30 G				

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The 81000-AK Wattkit features this easy-to-read RF Wattmeter (pictured here), with its optional carrying case and an array of elements and accessories. Coaxial Dynamics elements can be purchased separately for use in other manufacturer's Wattmeters. For more information on the 81000-A Wattmeter or any of the complete line of Coaxial Dynamics RF products and OEM components please contact Coaxial Dynamics, Inc.

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Call factory for name of your local distributor.

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Create Your Own Repeater For Special Events or Emergencies. Two Mobile Rigs Plus an RM-1 makes a Super, Fast Repeater.

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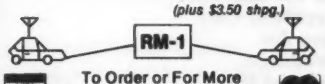

To Order or For More Information, Call or Write:

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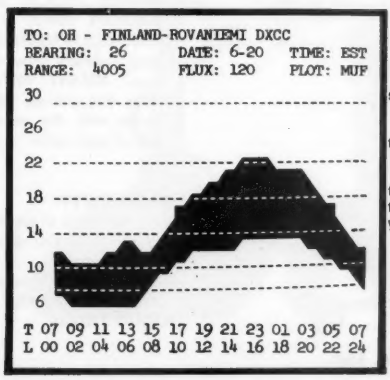

Propagation by Mufplot

MUFPLOT is being used by amateurs from HONG KONG to BAGHDAD, SOUTH AFRICA to ALASKA, by sailors, commerical companies and people who know the need of propagation forecasting at its best.

MUFPLOT will give you HPF, MUF, FOT with LUF plus distance and bearing (and time) to any target.

You can select over 400 listed targets by DX or ARRL prefix, lat/long, or state. The database will let you enter target data by what ever you want to call it and you can change it anytime.

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MUFPLOT gives you a video graph (and/or table) and printer display of band conditions. (A special DX function lets you see world conditions. You select the number of and locations you want). Band coverage for the C-64 is 6 to 30MHz video and less then 1 to more then 30MHz printer. The APPLE is 2 to 34MHz. You enter your QTH lat/long only once but you can change it anytime.

( ) denotes for the (C-64) only.
C-64 MUFPLOT V2 disk only $32.95
APPLE MUFPLOT disk only $37.95
North American orders add $2.00 for S/H all others $5.00.
VISA, M.C., personal checks accepted.
APPLE is the trade mark of APPLE Computer Co.
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MUFPLOT is a trade mark of BASE (2) SYSTEMS.

BASE (2) SYSTEMS
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Saginaw, MI 48601
Tel.517-777-5613

With SMART PATCH You are in CONTROL

With CES 510SA Simplex Autopatch, there's no waiting for VOX circuits to drop. Simply key your transmitter to take control.

SMART PATCH is all you need to turn your base station into a personal autopatch. SMART PATCH uses the only operating system that gives the mobile complete control. Full break-in capability allows the mobile user to actually interrupt the telephone party. SMART PATCH does not interfere with the normal use of your base station. SMART PATCH works well with any FM transceiver and provides switch selectable tone or rotary dialing, toll restrict, programmable control codes, CW ID and much more.

To Take CONTROL with Smart Patch – Call 800-327-9956 Ext. 101 today.

What To Look For In A Phone Patch

The best way to decide what patch is right for you is to first decide what a patch should do. A patch should:

- Give complete control to the mobile, allowing full break in operation.
- Not interfere with the normal operation of your base station. It should not require you to connect and disconnect cables (or flip switches!) every time you wish to use your radio as a normal base station.
- Not depend on volume or squelch settings of your radio. It should work the same regardless of what you do with these controls.
- You should be able to hear your base station speaker with the patch installed. Remember, you have a base station because there are mobiles. ONE OF THEM MIGHT NEED HELP.
- The patch should have standard features at no extra cost. These should include programmable toll restrict (dip switches), tone or rotary dialing, programmable patch and activity timers, and front panel indicators of channel and patch status.

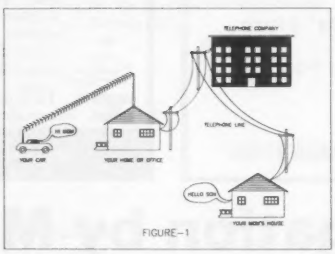
ONLY SMART PATCH HAS ALL OF THE ABOVE.

Now Mobile Operators Can Enjoy An Affordable Personal Phone Patch. . .

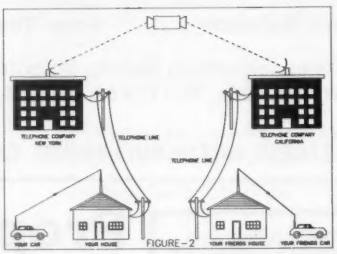
- Without an expensive repeater.
- Using any FM tranceiver as a base station.
- The secret is a SIMPLEX autopatch, The *SMART PATCH*.

SMART PATCH Is Easy To Install

To install *SMART PATCH*, connect the multicolored computer style ribbon cable to mic audio, receiver discriminator, PTT, and power. A modular phone cord is provided for connection to your phone system. Sound simple? . . . IT IS!



FIGURE–1



FIGURE–2

How To Use *SMART PATCH*

Placing a call is simple. Send your access code from your mobile (example: *73). This brings up the Patch and you will hear dial tone transmitted from your base station. Since *SMART PATCH* is checking about once per second to see if you want to dial, all you have to do is key your transmitter, then dial the phone number. You will now hear the phone ring and someone answer. Since the enhanced control system of *SMART PATCH* is constantly checking to see if you wish to talk, you need to simply key your transmitter and then talk. That's right, you simply key your transmitter to interrupt the phone line. The base station automatically stops transmitting after you key your mic. *SMART PATCH* does not require any special tone equipment to control your base station. It samples very high frequency noise present at your receivers discriminator to determine if a mobile is present. No words or syllables are ever lost.

SMART PATCH Is All You Need To Automatically Patch Your Base Station To Your Phone Line.

Use *SMART PATCH* for:

- Mobile (or remote base) to phone line via Simplex base. (see fig 1.)
- Mobile to Mobile via interconnected base stations for extended range. (see fig. 2.)
- Telephone line to mobile (or remote base).
- *SMART PATCH* uses SIMPLEX BASE STATION EQUIPMENT. Use your ordinary base station. *SMART PATCH* does this without interfering with the normal use of your radio.

WARRANTY?
YES, 180 days of warranty protection. You simply can't go wrong.
An FCC type accepted coupler is available for *SMART PATCH*.

Communications Electronics Specialties, Inc.
P.O. Box 2930, Winter Park, Florida 32790
Telephone: (305) 645-0474 **Or call toll-free (800)327-9956**

The DX is better out here. Ask anyone who owns an FT-726R.

It's true. Linking up to OSCAR 10 is the one sure way to bring the world into your ham shack. No matter where your shack is.

FT-726R owners know. You'll find them working the world from their apartments. Attics. And from their antenna-restricted neighborhoods.

They'll even boast of a signal quality and DX potential that would make any 20-meter operator envious. Regardless of where we are in the sunspot cycle.

In fact, the FT-726R is the world's most popular link to OSCAR 10.

And for good reason. This 2-meter, 10-watt rig gives you full cross-band duplex capability. Simply plug in two optional modules, one for 435-MHz operation, another for cross-band duplex.

You can set up your earth station just about anywhere. All you need is the 726 and two Yagi antennas: 435-MHz for transmit and 2-meters for receive.

Even as a conventional base station, the FT-726R is a real standout.

You can choose from three operating modes: SSB, FM or CW. Expand to three-band operation with your choice of optional modules for 10 meters, 6 meters, 430-440 MHz and 440-450 MHz.

Then store your preferred frequencies and modes into the eleven memories for instant recall. With pushbutton transfer capability to either of two VFO registers. And versatile scanning functions you'd expect from a Yaesu radio.

Plus you get a lot more extras, including a built-in speech processor, all-mode squelch and a noise blanker.

So no matter where your shack is, let Yaesu's FT-726R introduce you to OSCAR 10. The world is waiting.

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The Smallest HT!

TH-21AT/31AT/41AT

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- **High or low power.** Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.
- **Pocket portability!** Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) **with batteries!**
- **Expanded frequency coverage (TH-21AT/A).** Covers 141.000-150.995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.
  TH-31AT/A: 220.000-224.995 MHz in 5 kHz steps.
  TH-41AT/A: 440.000-449.995 MHz in 5 kHz steps.

- **Repeater offset switch.**
  TH-21AT/A: ±600 kHz, simplex.
  TH-31AT/A: −1.6 MHz, reverse, simplex.
  TH-41AT/A: ±5 MHz, simplex.
- **Standard accessories:** Rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery pack, wrist strap.
- **Quick change, locking battery case.** The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.
- **Rugged, high impact molded case.** The high impact case is scuff resistant, to retain its attractive styling, even with hard use.

See your authorized Kenwood dealer and take home a pocketful of performance today!

- **Easy-to-operate, functional design.** Three digit thumbwheel frequency selection and handy top-mounted controls increase operating ease.

Optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8** soft case for TH-21A/31A/41A
- **SC-8T** soft case for TH-21AT/31AT/41AT
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **Service manual**

More information on the TH-series HTs is available from authorized dealers.

Note: Specifications guaranteed for the 144.000-148.000 MHz Amateur band only. TH-21AT shown. Standard versions TH-21A/31A/41A without DTMF pad also available. Specifications and prices are subject to change without notice or obligation.

KENWOOD

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Compton, CA 90220.